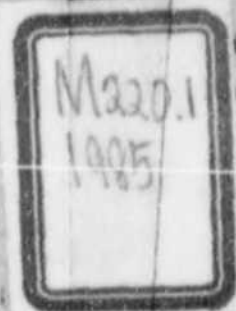


GOVERNMENT PUBLICATIONS DIVISION



# ANNUAL REPORT 1985

National Institute of Science and Technology

GOVERNMENT PUBLICATIONS DIVISION



1986 January

DR. EMIL Q. JAVIER  
Minister & Director General  
National Science and Technology Authority

Sir:

I have the honor to submit the Annual Report of the National Institute of Science and Technology for 1985.

The year 1985 marked the second full year of the new management at the Institute. The objectives that were set in July 1983, when the new management took over, were all realized in 1985. Finally, the Institute has become more credible to industry, and its plans and programs have become more relevant to the country's industrial and economic objectives.

Your strong support made this possible.

Very truly yours,

A handwritten signature in dark ink, appearing to read "Filemon A. Uriarte, Jr.", written in a cursive style.

DR. FILEMON A. URIARTE, JR.  
Director

# CONTRACT RESEARCH AND TECHNICAL SERVICE PROJECTS

In 1985, the NIST had 28 contract research and technical service projects, 25 of which were with private firms, and 3 with government agencies. Of these 28 projects, 8 were continuation of projects started in 1984, and 20 were new projects. These projects are listed in Table 1.

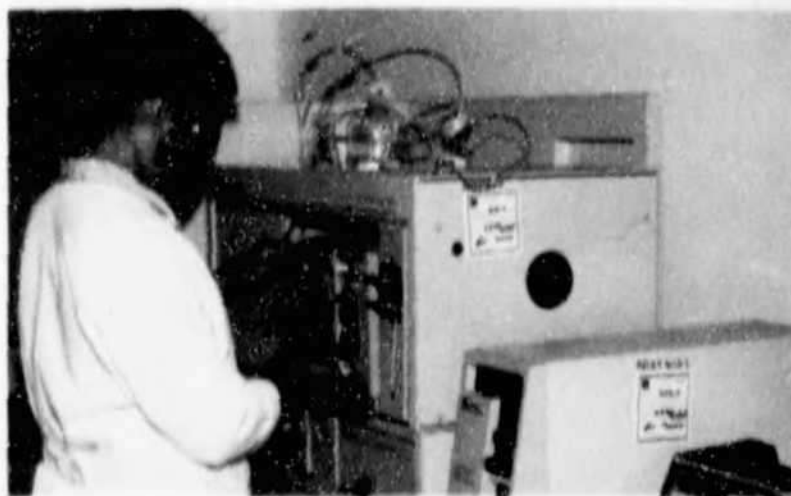
The contract research projects completed in 1985 were as follows:

## AVON Products Manufacturing, Inc.

The CRDC and NRDC completed in March 1985 a contract research project with AVON Products Mfg. aimed at developing the technologies for the production of chemicals used in the production of cosmetics, such as

*The AVON-NIST project on the production of glyceryl monostearate and aluminum chlorohydrate*

glyceryl monostearate and aluminum chlorohydrate, and the extraction of mineral oil from 'tubang-bakod' (*Jatropha curcas*). Because of the very promising results, AVON funded another research project with NIST in November 1985 to further refine the technology and scale-up the production of aluminum chlorohydrate from aluminum metal wastes.



## National Irrigation Administration

The NRDC's food technology program and CRDC's energy research program completed two projects with the National Irrigation Administration on the utilization and processing of cashew apple into foods, such as, juice, wine, vinegar, prunes and jam, and as animal feed, and on charcoal production from *ipil-ipil*. These 2 projects started in April 1984 and were completed in December 1985.



## Camaysa Wine Distillery

A five-month research project was signed by NIST food technology program and Camaysa Wine Distillery (CWD) in November 1984 for the improvement and process standardization of the production of export-quality 'lambanog', a local gin produced from coconut. This project was completed in April 1985.

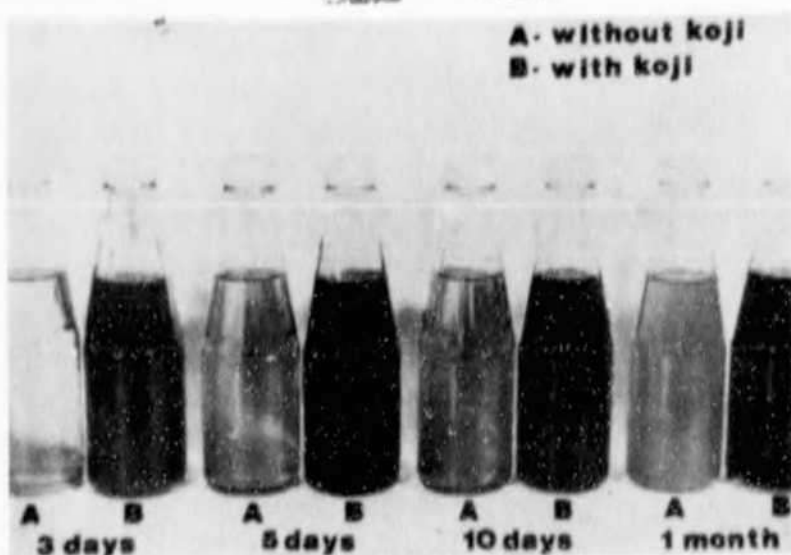
## Baymark Corporation

In 1984, the NIST food technology research program was asked by Baymark Corporation to develop the technology for the production

*NIA-NIST project on cashew apple processing and charcoal production*







production of 'patis' and 'bagoong'. The technology utilizes microbial *koji* starters to hasten the rate of protein hydrolysis and reduce fermentation time to three months.

*Accelerated fish sauce production technology commercialized at Florence Foods, Inc.*



of quality dehydrated local spices, such as, onion, garlic, pepper, and chili. This project was completed in December 1985.

#### Others

Four other contract researches/technical projects which started in 1984 were completed in 1985. These were: 1) *Wealth of Health*: on the improved production of instant dried 'tokwa', 2) *Hi-Tech Foods Inc.*: on the improved production and marketing of soy sauce, 3) *Rhone Poulenc*: on the safety and sterility tests of drugs; and 4) *Technology Resource Center* on the evaluation of thermal efficiency of solid fuels used in stoves.

Twenty (20) new contract projects were started in 1985, notable of which were as follows:

#### Florence Foods Corporation

A four-month research project was signed by NIST and Florence Foods Corporation (FFC) in January 1985 for pilot-scale



#### Philippine Refining Company

A six month research project conducted by NIST for Philippine Refining Co. (PRC) was started in February 1985. The project aimed for the improvement of existing dehydrated soybean curd ('tokwa') production technology, and the production of food flavors from local raw materials.

### Ramon M. Cordoba Corporation

Three (3) contract research projects have been signed between NIST and RMC Corporation. The first, started in August 1985, was for the pilot-scale production of activated carbon from selected raw materials. Another project, for the commercialization of the transparent and laundry soap technologies, was signed in October 1985. Some 842 bars of laundry soap and 800 bars of transparent soap were produced in November.

A third contract research project, between RMC and NIST pharmaceutical research program, started in August 1985, for the production of cough syrup and candy using local flavorings.



### Ephpheta Incorporated

In October 1985, Ephpheta retained CRDC-NIST to provide technical consultancy services for the establishment and commissioning of laundry soap plant. Ephpheta now produces soap on commercial scale and supplies 8000 bars/mo. to the refugee center in Bataan.



*Soapmaking technology transferred to RMC and Ephpheta*

### Manila Royal General Services

A series of lecture-workshops on fish canning were conducted in July and August 1985 as part of the agreement between NIST and Manila Royal General Services (MRGS).

### Jose de Castro Chua

A three-month research project was signed by NIST and Jose de Castro Chua in September 1985 for the production of semi-refined carrageenan from local *Eucheema* seaweeds.

### Philippine Coconut Research and Development Foundation

The NIST signed an agreement with PCRDF in December 1985 for the production of diesel fuel from coconut oil. The technology

*NIST-PCRDF project on coco diesel production*



*NIST trains MRGS on fish canning*



was developed by NIST and implemented on a commercial scale. Copra oil of varying free fatty acid (ffa) content was used as starting material.

### Oscar Ledesma and Co. and Pablo Trillana Saltfarm

The NIST signed contracts for the transfer of the improved industrial salt technology to a) Oscar Ledesma and Co. (OLCO) Saltfarm in Iloilo, and b) Pablo Trillana Saltfarm (PTS) in Bulacan. OLCO has a 50-hectare saltfarm, while PTS has a 24-hectare saltfarm. The latter intends to market industrial salt to the textile industry.



---

#### Seven-Up Philippines, Inc.

---

Two projects were undertaken by NIST for Seven-Up Phils. in September 1985, namely: a survey on 'kalamansi' (*Citrus microcarpa*) processing technology, and extraction of essential oil from 'kalamansi' rind.

---

#### RDL Trading

---

The NIST food technology research program agreed to conduct a trial run for RDL trading on the processing of 100 kg of dried mangoes.

---

#### Philippine Petrochemical Inc.

---

The NSTC, NIST signed an agreement with Phil. Petrochemical Inc. (PPI) in Sep-

tember 1985 for technical consultancy services to improve polystyrene production technology.

---

#### Sta. Monica Corporation

---

A one-month research project between NIST food technology and Sta. Monica Corp. (SMC) was signed in July 1985. The project objective was to standardize canning procedures for tuna chunks in oil and in brine.

#### Others

Eight (8) contract technical service projects were signed by NSTC, NIST with various companies. These projects involved the biological and chemical evaluation of various materials.

\*\*\*





# Table 1. CONTRACT RESEARCH AND TECHNICAL SERVICE PROJECTS IN 1985

Name of Company	Scope of Contract	Date Started	Name of Company	Scope of Contract	Date Started
• Baymark Corporation	Development of technology for the production of dehydrated spices	September 1984	• Sta. Monica Corp.	Technology for the canning of tuna chunks	May 1985
• Camaysa Wine Distillery	Development of improved technology for the production of export quality lambanog	November 1984	• National Irrigation and Administration	Development of technologies for the utilization of cashew apple into food, feed, and improvement of the current NIA ipil-ipil charcoal technology	June 1985
• AVON Products	Development of process for local production and synthesis of specialty cosmetic chemicals; aluminum chlorohydrate, glyceryl monostearate, and mineral oil	November 1984	• Rebtrade Intl. Corp.	Biological and chemical evaluation of products and their raw materials	June 1985
• Florence Foods Corp.	Development of technology for the accelerated production of fish sauce (patis)	January 1985	• RDL Trading	Technology for the processing of dried mangoes	July 1985
• Wealth of Health Food Center	Development of processing technology for dehydrated instant tokwa	January 1985	• Seven-Up Phils. Inc.	Preparation of status report on 'kalamansi'; production of 'kalamansi' in oil using NIST technology	September 1985
• Hi-Tech Foods Inc.	Production and test marketing of soy sauce using NIST technology	January 1985	• Technology Resource Center	Evaluation of thermal efficiencies of solid fuels used in stoves	September 1985
• Phoenix Pharmaceuticals Inc.	Biological and chemical evaluation of products and their raw materials	January 1985	• Petrochem	Evaluation of polystyrene synthetic resin products to improve manufacturing technology	September 1985
• Asephil Mfg. Inc.	Biological and chemical evaluation of products and their raw materials	January 1985	• Manila Royal General Services	Training of overseas workers on fish canning	September 1985
• Rhone Poulanc Phil. Inc.	Biological and chemical evaluation of products and their raw materials	January 1985	• Jose de Castro Chua	Development of the technology for the production of carrageenan from <i>Eucheira-seaweeds</i>	September 1985
• Smith Kline & French Overseas Co.	Biological and chemical evaluation of products and their raw materials	January 1985	• RMC Corporation	Pilot plant production of powdered activated carbon; technology transfer of process for the production of transparent and laundry soap; and development of process for the production of cough syrup and drops from natural products	August 1985
• Phil. Refining Co.	Improvement of the existing technology for the production of tokwa and development of technology for the production of food flavors from local materials	March 1985	• Ephpheta Inc.	Technical services for commercial scale production of laundry bar soap from coconut oil	October 1985
• MPWH—Office for Rural Water Supply	Biological and chemical evaluation of products and their raw materials	March 1985	• Oscar Ledesma & Co.	Transfer of technology for the production of industrial grade salt	November 1985
• Five and Ten Cents Marketing	Biological and chemical evaluation of products and their raw materials	March 1985	• Mr. Pablo Trillana II	Transfer of technology for the production of industrial grade salt	November 1985
• KORI Phils.	Biological and chemical evaluation of products and their raw materials	April 1985	• Phil. Coconut Research and Development Foundation	Improvement of NIST technology for the production of diesel fuel from coconut oil	December 1985

# ASSISTED PROJECTS

In 1985, the NIST has a total of 32 assisted projects half of which received funding from foreign sources. Of these, two projects, with technical assistance from the Japanese government through Japan International Cooperation Agency (JICA) and Government Industrial Development Laboratory Hokkaido (GIDLH), were completed in 1985; two were new projects; and the remaining 28 were continuing projects. Table 1 lists these assisted projects and the various local and foreign institutions which provide funding.

## FOREIGN

ASEAN-Australia Economic Cooperation Program (AAECP)

**STANDARDIZATION OF DEHYDRATION AND SMOKING PROCEDURES FOR FISH AND SHELLFISH PRODUCTS.** Formulation, packaging, and storage studies for dried *tunsoy*, *bisugo*, and *hasa-hasa* were conducted. Standard dehydration and packaging procedures for *tunsoy* and *bisugo* were developed to improve the organoleptic quality and shelf-life of the dried products. Packaging in PET/PE pouches and storage at low temperature delayed onset of mold growth. The use of vinegar in the soaking medium prior to drying improved the organoleptic and keeping quality of the dried fish when stored even at ambient conditions.



*Food products developed with AAECP assistance*

**CHEMICAL HAZARDS IN FOODS.** The project aims to determine the levels of heavy metals in raw and processed foods, and to identify their sources in order to institute preventive measures. Samples of marine bivalves were collected and analyzed for their cadmium, lead, and mercury content. Levels of lead and mercury were found to be within the limits set by the Food and Agriculture Organization and the World Health Organization.

**CHARACTERIZATION OF FOOD CONSTITUENTS IMPORTANT TO PROCESSING.**

The project aims to determine the physico-chemical properties of commercially-important fruits, to monitor the changes in these properties during ripening, processing, and storage, and to correlate these data to the yield and acceptability of processed products. In 1985, physico-chemical analyses were conducted on *langka* (*subahin* variety) and *carabao* and *piko* mangoes.

**DEVELOPMENT OF STANDARDS FOR DEHYDRATION AND SUGAR PRESERVATION OF FRUITS AND VEGETABLES.** Process standardization and storage studies for dehydrated and preserved fruits were conducted. Storage studies on *langka* pastilles indicated that the pastilles were acceptable even after 10 months of storage. Packaging studies were conducted for dehydrated candied *langka*, and candied pineapple was produced from mature and immature fruit.

**APPLICATION OF MISCELLANEOUS TECHNOLOGY TO UPGRADE SELECTED FOOD PROCESSING WASTES AND BY-PRODUCTS FOR HUMAN CONSUMPTION.** The technology for the production of coconut water beverage was developed and transferred to Harman Foods, Inc. The product is now being market tested with favorable results. Technologies were also developed for the production of sauces and condiments from coconut meal residues, soy residues, and fish processing wastes.

**PRODUCTION OF ANTIBIOTICS AND/OR VITAMINS FROM FOOD WASTES.** Chlorotetracycline and vitamin B12 were produced in a medium of buffered coconut matter, with cornsteep liquor as protein source and starch and sucrose as carbohydrate source for the organism. Studies were being conducted on the use of solid cultures to improve process economics and eliminate the extraction process.

**PRODUCTION OF ANIMAL FEEDS FROM AGRO-INDUSTRIAL WASTES.** Broiler feeding studies on cashew apple pomace and ensiled trash fish are on-going. Analysis of several food waste materials has also been conducted to assess their suitability for use as animal feeds. These include *atis*, *guyabano*, and jackfruit seeds, *papaya* rejects, and castor oil bean meal. Simultaneously, the NIST is trying to establish contact with prospective recipients of the technology.

**PRODUCTION OF BIOGAS FROM AGRO-INDUSTRIAL WASTES.** The biogas generating capacity of distillery slops, coconut water, and sugar factory effluents was determined. The equipment used was an anaerobic upflow filter reactor, and various packing materials were used.

---

Government Industrial Development  
Laboratory in Hokkaido (GIDLH)

---

**PYROLYSIS OF URBAN AND INDUSTRIAL WASTES.** The five-year joint NIST-GIDLH (Japan) project on the pyrolysis and gasification of urban and agro-industrial wastes was successfully completed. Low-calorie gas produced from the fluidized bed gasification of wastes using air was used for power generation. Gas product with heating value as low as 1,100 kcal/Nm<sup>3</sup> was found suitable for power generation in the rural areas. A project proposal on the technology for the pilot plant-scale production of gaseous fuel was submitted to ITIT, AIST, MITI, Japan through NEDA; and also to PCIERD for counterpart financial assistance.



**PRODUCTION OF SLOW-RELEASE FERTILIZER FROM PHILIPPINE DOLOMITE AND RICE HULLS.** A newly started project assisted by GIDLH is aimed to determine the availability and source of raw materials to be used in the production of slow-release type fertilizer from Philippine dolomitic limestone and rice husks. Samples of dolomitic limestones from Cebu and rice husks from Laguna were sent to GIDLH, Japan where characterization studies were



*GIDLH assistance for NIST fertilizer project*

conducted by NIST research counterpart on the raw materials. Mixtures of dolomitic limestones and rice husks were subjected to heat treatment at various temperatures ranging from 200 to 1100°C. Thermal analysis was also applied. Fertilizer components of the products obtained. ( $\text{SiO}_2$  and  $\text{CaMg}$ ) were analyzed.



*JICA-assisted project on establishment of activated carbon plant in the country*

Japan International Cooperation Agency (JICA)

#### **FEASIBILITY ON THE ESTABLISHMENT OF POWDERED ACTIVATED CARBON PILOT PLANT IN THE PHILIPPINES.**

With technical assistance from JICA, the studies on the production of activated carbon from selected wood and agricultural wastes were also completed. A pilot test plant was installed for use in the evaluation of the technical aspects on the production of powdered activated carbon utilizing sawdust and other wood-based materials. Based on the results of the study which included the technical, financial and socio-economic and marketing aspects, the project was found feasible for commercialization.



Japan Society for the Promotion of Science (JSPS)

**BIOTECHNOLOGY OF BIOFUELS AND WASTE MANAGEMENT.** The project objectives cover the isolation and improvement of microorganisms for biofuels production and the design of bioreactors. NIST personnel involved in the project have undergone special training in Japan. Assisted by Japan Society for the Promotion of Science in terms of training skills of NIST researchers.

International Development Research Center (IDRC)

**IMPROVEMENT OF FISH SAUCE MANUFACTURE.** The project on the "Improvement of Technology and Production of Fish Sauce and Paste in the Philippines" funded by the IDRC has completed its one year of implementation. The project has so far worked with two cooperators, the L & B Food Products and General Merchandise in Tanza, Cavite and Tentay 'Patis' and 'Bagoong' Factory in Navotas, Manila. Accelerated fish fermentation was tested and applied in these two cooperators, using *koji* enzyme with rice bran as starter medium and copra meal as culture medium. Good quality 'patis' was obtained within 3 months with the introduction of the *koji*. A survey of *patis* and *bagoong* manufacturers in Manila, Cavite, Batangas, and Pangasinan was conducted to provide data for establishing profile of the industry. Seventeen commercial brands of *patis* were studied as to their conformity to Philippine Standard Agency's specifications for fish sauce.

## LOCAL

NSTA and Attached Agencies

### **INTEGRATED CITRIC ACID PROJECT.**

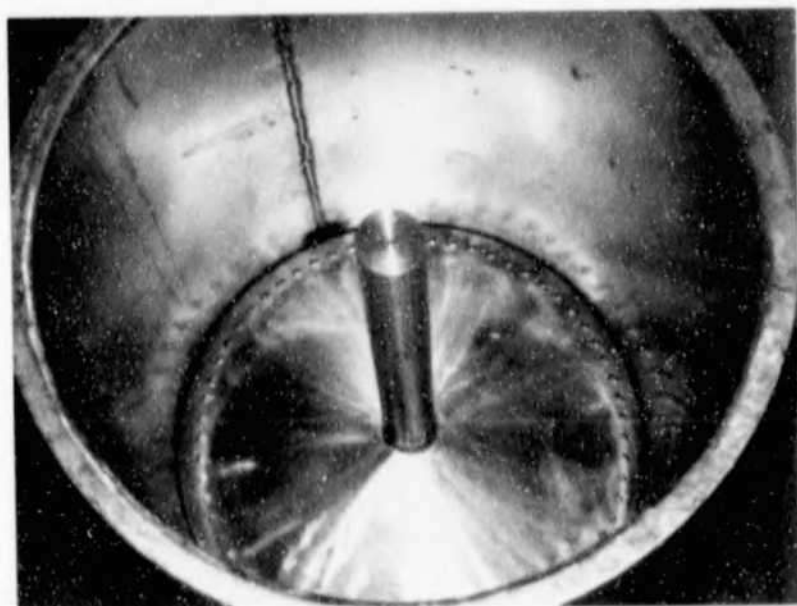
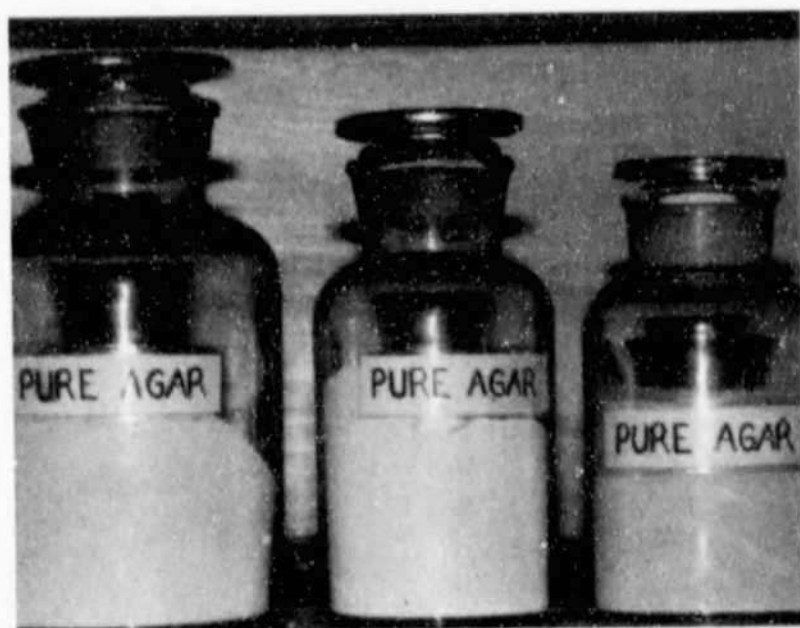
The development of a submerged process for citric acid production and the design of a pilot plant have been completed. The project received financial assistance from NSTA.

### **PRODUCTION OF DEXTRAN AND FRUCTOSE FROM SUCROSE.**

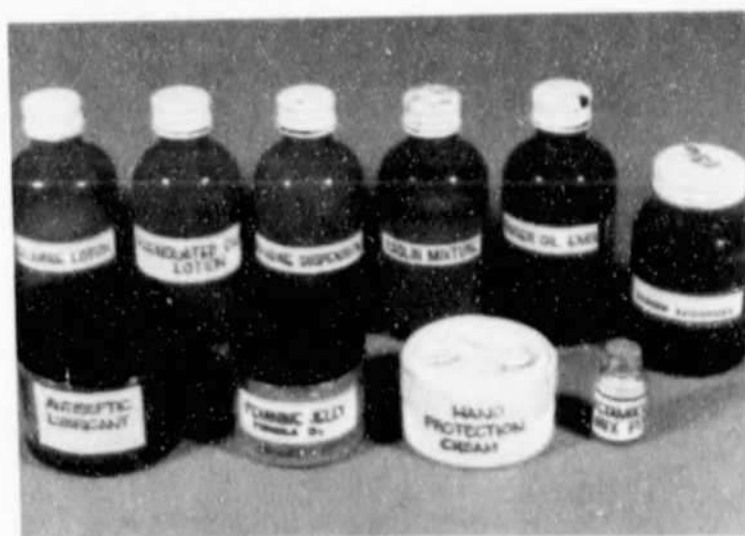
Parameters for the biochemical production of dextran were optimized. Maximal yield of dextran-sucrose was obtained in a shorter fermentation time of 9 hours as compared to the previous 11-12 hours. Enzyme activities obtained were in the order of values comparable to published literature. A closer approach to the determination of optimal substrate concentration in the production of dextran via cell-free enzyme process was conducted. Results obtained showed that dextran yields are maximized with a substrate concentration of 7.5%. Further studies on the hydrolysis of raw dextran were conducted considering new batches of raw dextran produced at different conditions. The desired molecular weight (1,000-10,000) were obtained either as the 65% or 75% ethanol insolubles. Dextran with higher molecular weights than the desired ranged were recycled and further hydrolyzed, yielding 80-95% of desired new dextran. Polydispersity data obtained were also within the acceptable range. The NSTA funded this project.

### INTEGRATED AGAR-AGAR PROJECT.

A process for the extraction and refining of bacteriological-grade agar from local seaweeds was developed. Studies on the suitability of the product for food processing applications and as microbial culture medium were also conducted. Results showed that the seaweed *Gracilaria verrucosa* from 2 places in Cavite was suitable for producing refined agar comparable to Difco bacto agar. The physico-chemical analyses indicated it to conform with USP specifications. The yields of crude and NIST refined agar on dry weight basis are 25.3% and 14.4% respectively. The PCIIRD gave financial assistance to this project.



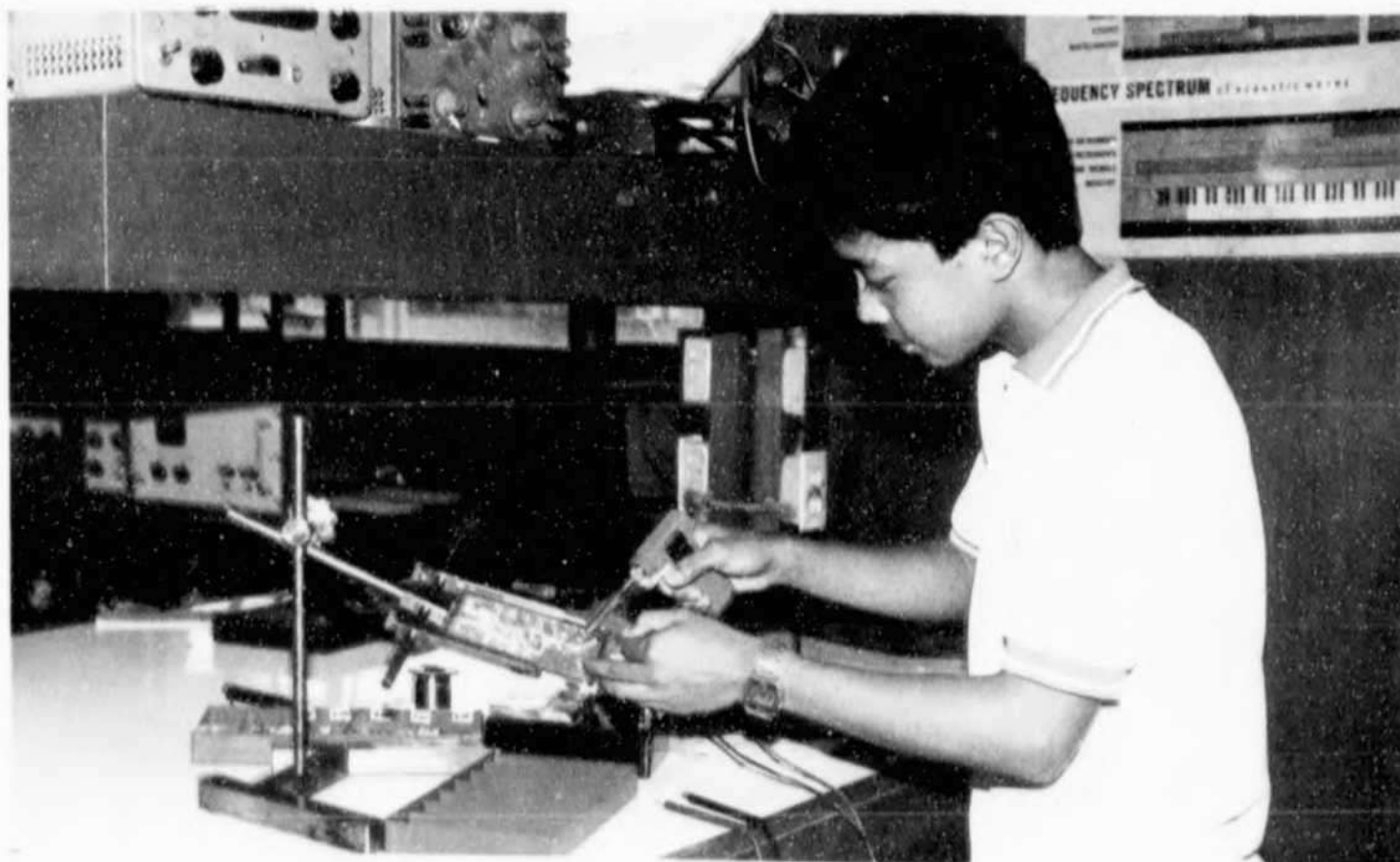
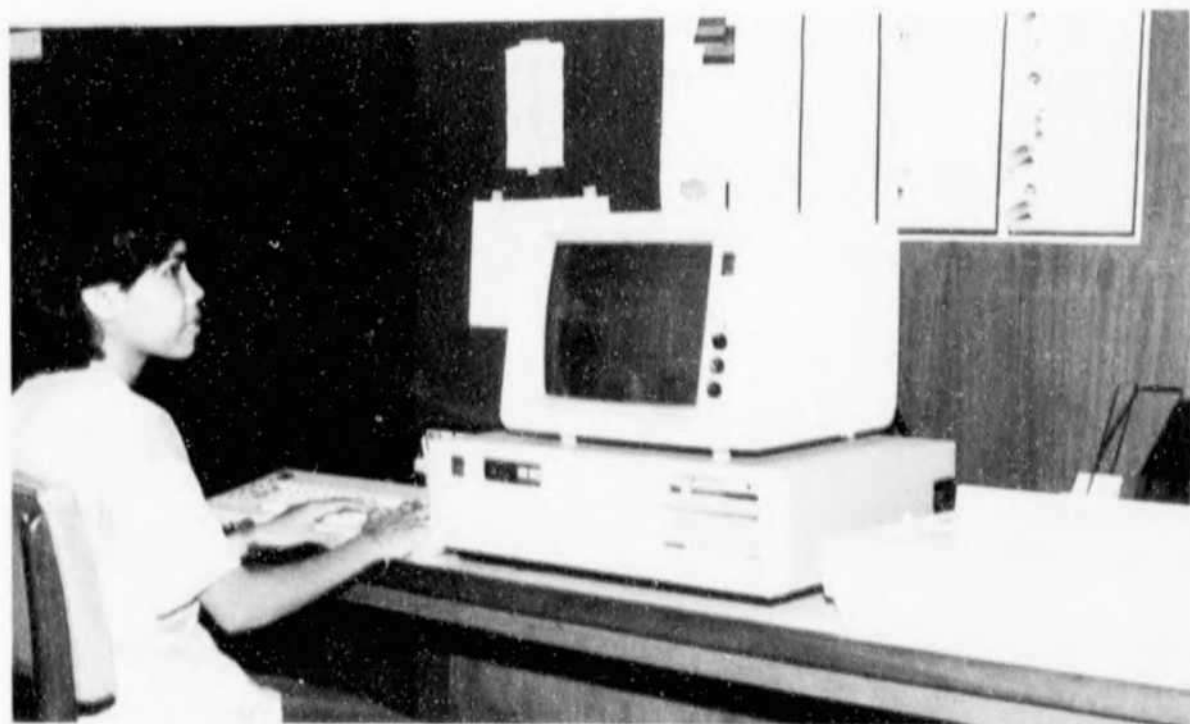
*Integrated agar project funded by PCIIRD*



# *ESTABLISHMENT OF ELECTRONICS RESEARCH AND DEVELOPMENT CENTER.*

The project which is currently assisted by the PCIERD, NSTA has completed the modules for the design of an electronic monitoring and control system for a fermentor. Results of the study will be applied not only for the fermentor circuit but also for other projects. Already, the project

constructed a working prototype of an electronic blood pressure apparatus, a functional pH meter with digital display, and an electronic timer. Electronic components, supplies and handtools used in circuit development were purchased. An extensive electronic industry survey was conducted to gather information for long term planning of the project.



#### **EXTRACTION OF ESSENTIAL (VOLATILE) OILS FROM PHILIPPINE FRUITS.**

The extraction method utilized was solvent extraction using petroleum ether as solvent. Aromatic oils were obtained from *kaimito* peelings and *guyabano* pulp. Pure samples of the oil were analyzed by thin-layer and gas chromatography to determine their components. This project received financial assistance from NRCP.

#### **FACTORS AFFECTING THE PRODUCTION OF ALGINIC ACID FROM BROWN SEAWEEDS.**

Studies were conducted on several factors affecting the yield and quality of alginic acid from brown seaweed; the NIST modified extraction method was found superior to other methods tested. Studies on the effect of bleaching were also conducted. This is another NRCP-assisted project.

#### **STRUCTURAL ELUCIDATION OF COMPOUNDS ISOLATED FROM EXTRACTED PIGMENTS.**

Pigments were extracted from the pulp of *pili* fruits, *ipil-ipil* seeds, *alascuatro* flowers, and *achuete* seeds. Spectral and chromatographic studies indicated the presence of flavonoid aglycones, anthocyanins, and rutin in the extracts. This is a new project funded by NRCP.

#### **ASSESSMENT OF THE WORK ENVIRONMENT AND HEALTH OF WORKERS IN THE PLASTIC INDUSTRY.**

The study was aimed at assessing the work environment and health of workers of the plastic manu-

facturing industry with particular attention to firms using vinyl chloride monomer or materials contaminated by it. A survey based on the sample of 22 companies was conducted for more in-depth studies on the occupational health and safety of workers including ocular inspection and review of medical records. A paper entitled "The Work Environment in the Philippines - The Case of the Plastic Industry" was presented during the IRF lecture series. The project receives financial assistance from PCHRD.

Other NSTA-assisted research projects and their funding allocation were as follows: 1) Upgrading of Capability of National Standards and Testing Center, 2) Electronics Research and Training Laboratory, 3) Fermentation Research Laboratory; and two publications assistance, namely the *NIST Journal* and *Philippine Journal of Science*.

---

#### **Others**

---

#### **IMPACT OF TIWI GEOTHERMAL PLANT EMISSIONS ON VEGETATION, WASTES, AND SOIL.**

Sampling sites were selected and samples of the vegetation were collected; plant samples were analyzed for particulate matter, pH, chlorophyll content, mineral content, and energy content. Soil samples were also collected and analyzed. This project is funded by NEPC.

\*\*\*



The establishment of Electronics Research and Development Center with PCIERD and NSTA assistance



Project Title	Granting Agency	Amt. Granted
<b>FOREIGN</b>		
• Dehydration and Sugar Preservation of Fruits and Vegetables	NSTA-ASEAN-Australia	P 54,789.00
• Characterization of Food Constituents Important to Processing	NSTA-ASEAN-Australia	70,224.00
• Standardization of Dehydration Procedure for Fish and Shellfish	NSTA-ASEAN-Australia	60,124.00
• Chemical Hazards in Foods	NSTA-ASEAN-Australia	66,002.00
• Application of Miscellaneous Technologies to Upgrade Selected Food Processing Wastes and By-Products for Human Consumption	NSTA-ASEAN-Australia	370,000.00
• Animal Feeds from Food Processing Wastes	NSTA-ASEAN-Australia	303,000.00
• Pilot Scale Studies of Selected Food Processing Technologies	NSTA-ASEAN-Australia	919,346.00
• Utilization of Food Waste Materials for Fuels, Foods and Animal Feeds Production - Biogas from Wastes Materials	NSTA-ASEAN-Australia	260,000.00
• Production of Organic Acids from Food Waste Materials	NSTA-ASEAN-Australia	290,000.00
• Utilization of Food Waste Materials for the Production of Antibiotics and Vitamins	NSTA-ASEAN-Australia	290,000.00
• Improvement on the Technology and Production of Fish Sauce (Patis) and Fish Paste (Bagoong) in the Philippines	International Development Research Center (Canada) IDRC	351,204.00
• Anaerobic Treatment of Sugar Factory Waste-Waters*	BKH Netherlands	90,000.00
• Production of Slow Release Fertilizer from Philippines Dolomite and Rice Hulls*	GIDLH	Equipment grant/Training of local researchers in Japan & provision of experts
• Pyrolysis of Urban and Industrial Wastes Into Usable Products**	GIDLH	- do -
• Feasibility Study on the Establishment of Powdered Activated Carbon Pilot Plant in the Philippines**	JICA	- do -
• Biotechnology of Biofuels and Waste Utilization	JSPS Japan	- do -
	<b>TOTAL</b>	<b>P3,124,689.00</b>

**Table 1.**  
**ASSISTED PROJECTS IN 1985**

Project Title	Granting Agency	Amt. Granted
<b>LOCAL</b>		
• Integrated Agar-Agar Project	PCIERD	P 449,978.40
• Electronics Research and Development Center	PCIERD	1,705,602.00 <sup>3</sup>
• Development and Utilization of Local Tanbarks Extract for Leather Tanning	PCIERD	70,000.00
• Extraction of Essential (Volatile) Oils from Some Philippine Plants	NRCP	45,390.40
• Factors Affecting Production of Alginic Acid from Selected Brown Seaweeds	NRCP	46,658.40
• Structural Elucidation of Isolated Compounds from Extracted Pigments	NRCP	90,117.03 <sup>1</sup>
• Impact of Tiwi Geothermal Plant on Soil Water and Vegetation	NEPC	25,000.00
• Production of Dextran and Fructose from Sucrose	NSTA	398,145.00
• Integrated Citric Acid Project	NSTA	2,512,987.00
• Upgrading of Capability of National Standards and Testing Center	NSTA	3,767,869.00 <sup>2</sup>
• Electronics Research and Training Laboratory	NSTA	1,516,685.00
• Fermentation Research Laboratory	NSTA	1,061,815.30 <sup>3</sup>
• Printing and Publication of the <i>NIST Journal</i>	NSTA	116,767.49
• Philippine Journal of Science	NSTA	85,075.87
• Assessment of the Work Environment and Health of Workers in the Plastic Manufacturing Industry	PCHRD	330,000.00
• Integrated Research on Indigenous Medicinal Plants for Family Planning	POPCOM	257,289.25
	<b>TOTAL</b>	<b>P12,479,378.00</b>

\* New Projects

\*\* Completed in 1985

1/ New Project

2/ Total amount spent in 1985

3/ Carry-over of 1984 allotment

# REGULAR PROJECTS

## NATIONAL RESEARCH AND DEVELOPMENT CENTER

### Food Technology

---

#### *Development of Food Processing Technologies*

---

Processing technologies were developed for fruits and vegetables, nuts, oil seeds and legumes, and fish and shellfish products.

Formulations for *buko* - fruit mix with the addition of kaong and *buko* - langka blend were standardized. Also, thermal death time studies for sweet preserves (*langka*, chickpeas, and *macapuno*) were conducted.

For fish and shellfish products, storage studies for dried smoked mussels and tulingan and thermal processing requirements for canned *tambakol* were already completed. About 300 kgs of copra meal-based *koji* used to speed up the fermentation process for 'patis' and 'bagoong' manufacture were produced.

---

#### *Physical, Chemical and Microbial Studies on Some Selected Foods*

---

Characterization studies on pineapple and *atis* fruits were conducted. The NIST found that both total carotenoids and soluble solids in the pineapple increase as the fruit ripens, while the titratable acidity decreases, and tannin slightly affected during ripening. The pectin fractions of other fruits such as *atis*, papaya, and *lanzones* were also determined.

Various fruits, and meat products were also studied as to their microbial and chemical hazard contents. Lead (Pb)

and cadmium (Cd) contents in the fruit juices of pineapple, grapefruit, papaya, and mango nectar were analyzed. On the other hand, cold cuts such as hotdog, ham, and bacon bought from local markets revealed high microbial count for *Staphylococcus*, yeast, and mold.



*The protein analysis of NIST-developed foods*

---

#### *Establishment of Food Research Experimental Stations*

---

The cooperating centers for coco-based products in Gingoog City, and fruits and vegetable-based products in Don Mariano Marcos Polytechnic State University, Cagayan de Oro were newly-established.

lished, in addition to three centers in Lucena City, Quezon (coco-based), Angeles City, Pampanga and Indang, Cavite (fruits and vegetable-based). Banana chips produced in the Cavite Center have been approved by US Food and Drug Administration for export.

## Industrial Fermentation

### Improvement and Development of Fermentation Technologies

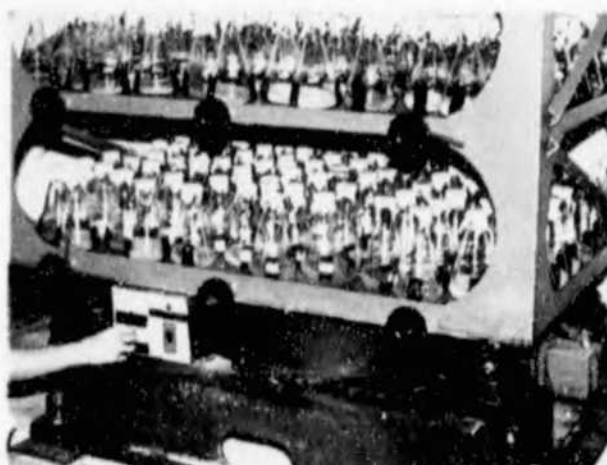
Production of industrial enzymes such as amylase and cellulases was undertaken. Alpha-amylase production by a laboratory contaminant, *Bacillus subtilis* (coded MJ5) had been optimized using starch-coconut water supplemented with inorganic salts as substrate. Two highly active cellulytic fungi, *Penicillium purporogenum*

and *Aspergillus fumigatus* were also isolated.

A single-stage continuous alcohol process (coded NIST Process 2) was developed using flocs of a double mutant of a yeast fusant in a 1.5L tubular glass fermentor. The process could produce ethanol concentration of 7-8% in about 1-2 hours by passing non-sterile molasses solution (14° to 22° Brix, about 10-15% sugar) into the column thus, giving maximum productivity of 87 g/l/h and conversion efficiency of 86%.

Organic acids for chemicals, pharmaceutical and food industries were also produced. Two acetic acid bacteria were used in producing acetic acid or vinegar from alcohol-coconut water mixture, both by surface and submerged methods. The surface method yielded a 6.26% acetic acid solution in 5 days, and 4.66% by the submerged process.

The fermentation laboratory has a pool of equipment like fermentor, incubator - shaker, laminar flow and incubator



---

### Strain Improvement of Industrial Microorganisms

---

Genetic improvement of yeast strains has been continued using induced mutation and selection and protoplast fusion techniques. Three strains were obtained from alcohol and temperature tolerant FATT-2 obtained from F9-5 by continuous alcohol fermentation of high molasses concentration (up to 35% total sugar and temperature up to 37°C), namely: 1) FSAT 7-2 obtained by UV irradiation of FATT-2 and selected by adaption to 12% alcohol at 40°C in a continuous fermenter; 2) F7-1 obtained by protoplast fusion of FATT-2 and FSAT 7-2 and 3) FC-3 obtained by protoplast fusion of FATT-2 and a Cebu strain.

### Pharmaceutical Research

---

#### Flavorants, Aromatics and Colorants from Selected Species

---

Ginger oil was extracted from air-dried and frozen plant samples by hydro-steam distillation. About 0.5 mL of ginger oil was found completely soluble in 1 mL of 95% ethyl alcohol. Thin layer chromatography data showed a decreasing stability of the oil with longer storage and exposure to sunlight.

---

#### Binders, Emulsifiers, Suspending Agent and Stabilizers

---

Seaweeds like *Sargassum*, *Hypnea*, and *Gracilaria* were tapped as raw materials for the production of phycocolloids used as binders, thickeners, emulsifiers, suspending agents and stabilizers by various industries. Alginic acid was extracted from *Sargassum* with the highest yield of about 19-29% obtained from samples collected in Mauban, Quezon. Kainic acid was also extracted from *Digenea simplex*. Highest

agar yield was obtained from *Gracilaria verrucosa* sp. collected from Talaba, Bacoar, Cavite.

---

#### Formulation and Synthesis of Plant Derived Compounds

---

Plant hydrocolloids such as agar, alginic acid, carrageenan, and pectin and oil from kalamansi (*Citrus microcarpa* Bunge), ginger oil, and pigments were used in the formulation of feminine jelly, guanidine suspension, ginger oil emulsion, kaolin mixture, metamucil instant mix powder, calamine lotion, antiseptic lubricant, and industrial hand protection cream. Shampoo was also formulated from *Entada phaseoloides* (gugo).

---

#### Therapeutically-Active Alkaloids, Glycosides and Tannins

---

Local plants such as *chichirica*, avocado, *bataw*, and *bayabas* were tapped as sources of alkaloids, glycosides and tannins. Extracts from *chichirica* plant samples were prepared by both hot and methods using 50% ethanol, normal saline solution in HCl, and distilled water as solvents. Twenty three (23) *chichirica* plant samples were found to be biologically active against test microorganisms.

About 665 milligrams of semi-purified cardiac glycosides were obtained from 1.2 kilos of air-dried avocado seeds. With butanol extraction, a crude, dark-colored residue was obtained which contained mixtures of other glycosides and impurities. *Bataw* seeds will also be extracted for glycosides.

Tannins extracted from *bayabas* (guava) tree barks were analyzed by thin-layer chromatography and subjected to *in-vitro* testing using Tannin USP control. Their antibacterial activities were also tested using *Pseudomonas aeruginosa* and *Escherichia coli* as test microorganisms.



## CHEMICAL RESEARCH AND DEVELOPMENT CENTER (CRDC)

### Organic Chemicals

#### *Specialty Chemicals/Products from Coconut Oil*

Laboratory synthesis of sodium lauryl sulfate using  $C_{12}$  methyl ester fraction of coconut oil produced lauryl alcohol. A solvent-extraction of a fixed oil from calamansi seeds yielded 28.27% oil which showed a fatty acid length of 18 carbon when analyzed.

#### *Oleochemicals from Locally Available Vegetable Oils /Animal Source*

Castor oil was sulfonated using concentrated sulfonic acid at a volume ratio of 3 parts oil: one part acid at 45 minutes reaction time. This resulted in a lower iodine value but similar to organically combined sulfonic anhydride.

### Inorganic Chemicals

#### *Recovery of Potassium Sulfate ( $K_2SO_4$ ) From Bitterns*

Experiments were conducted under varied conditions of time and temperature, concentration and volume of acid, density of solution, and methods of crystallization. Design and specifications for the fabrication of a high-temperature furnace ( $1600^{\circ}$ - $1800^{\circ}C$ ) needed to fuse  $Mg(OH)_2$  to  $MgO$  was also undertaken.

#### *Preparation of Chrome Compounds*

Preliminary experiments were conducted to determine the effect of temperature and roasting time on the conversion of chromite to sodium chromate using so-

dium carbonate and limestone as fluxing agents.

### Energy

#### *Fuel Briquettes Production From Coal Fines and Paper*

The production of good-quality fuel briquette products was conducted using the fabricated hydropulper and molder. The products passed the impact resistance and strength tests.

#### *Pre-Pilot Scale Production of Petroleum Fuel Substitutes From Coconut Oil*

Catalytic cracking of coconut oil was conducted using a locally fabricated 50-liter capacity wood fired reactor/converter.

### Engineering

#### *Piloting Studies*

Mini-pilot plants for the following were set-up: 1) recycling of used crank-case oil, 2) the production of cocodiesel, and 3) bench-scale production of refined oil from fresh coconut. At present, test runs are being undertaken to optimize processing parameters for eventual bigger scale operations.

#### *Machinery and Equipment Design and Fabrication*

Already designed and fabricated were: honey comb filter rewinder, gata expeller, essential oil extractor, fermentation tank assembly, mill grinder, solar water heater, and force-draft oven for agar-agar research.

### *Research and Development Studies on the Coconut Husk*

The production of rope and twine without the use of a cotton thread runner was conducted. An experimental set-up to produce long coconut husk fibers was designed and fabricated consisting of steel spikes for the extraction of fibers, unraveling machine, slivering machine, and twine and rope making machine. Dyed

long fibers suitable for handicraft manufacture were also produced.

### *Industrial Application of Castor Oil*

Sulfonation and production of brake fluid, drying oils, were studied. The castor oil used was extracted by a hydraulic press, followed by solvent extraction.

\*\*\*



# TECHNICAL SERVICES

## STANDARDS AND TESTING

Demand for the technical services of the NSTC increased significantly during the year as a result of the Center's continuing efforts to improve and expand its services. Fees collected amounted to P1,307,648.64 which was 48.2% higher than the 1984 income (Table 1).

For testing and analysis services, 7,654 samples of various products and materials were processed at eleven laboratories of the NSTC. Included are samples from the Analytical Equipment Laboratory and the Biology and Toxicology Department which completed their first full year of technical service operations. The number of samples tested and analyzed was 11.4% more than the last year's volume. Fees collected totalled P894,668.37 which was a 73.2% increase over 1984's income. The number of samples tested or analyzed, comparisons with 1984 volumes and typical analysis or

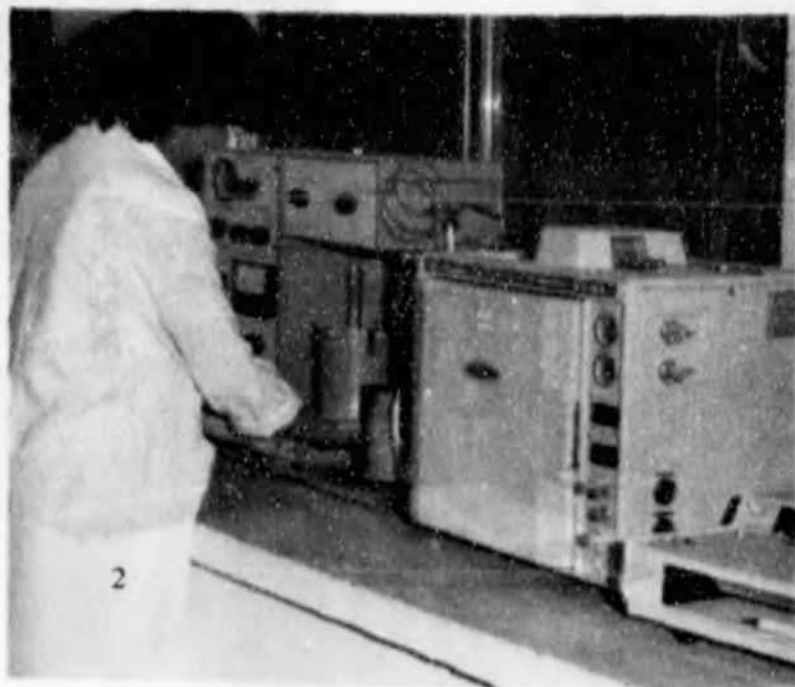
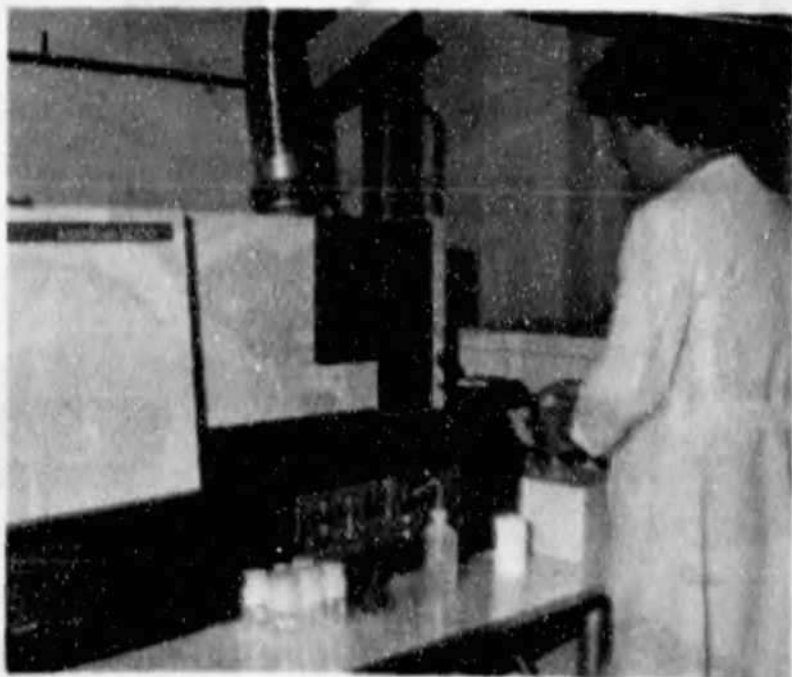
tests performed in each laboratory are shown in Table 2.

The Analytical Equipment Laboratory started operating in late 1984 using sophisticated analytical equipment including: an Atomscan 2000 unit, two units of high pressure liquid chromatography (HPLC) equipment, Orion specific-ion electrode systems, gas chromatograph, and an atomic absorption spectrophotometer. The spectrophotometer and one of the HPLC units were made operational in 1985 while an amino acid analyzer and an infrared spectrophotometer were being repaired and upgraded will be operational in 1986.

The Biology and Toxicology Department completed its first full year as a technical service unit since the department was placed under the NSTC during the reorganization of 1984. Safety, sterility and toxicity test services are available for various products and materials.

*To carry out technical services and R & D activities, the NIST has a pool of modern analytical equipment such as*  
1) atom scan, 2) gas chromatograph, 3) atomic ab-

*sorption spectrophotometer, 4) flame photometer, 5) high pressure liquid chromatograph, and 6) nitrogen analyzer*

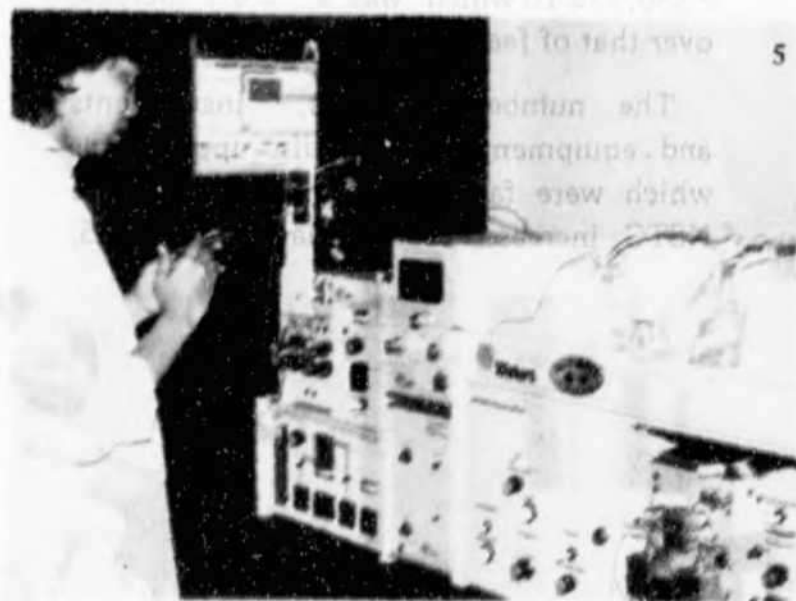






The Technical Support Section is a newly established unit which was designated to service the NSTC's equipment. However, it also accepts service contracts from the public. The section offers special services which are not handled by the other laboratories such as tests for the presence of asbestos, determinations of the combustibility of charcoal and the special commissioning of instruments. It also provides consultancy services for the formulation of documentary standards.

The Cebu Regional Station started offering food testing services in 1985. The project was initiated in response to the great need for such services as there



Calibration and metrology services posted 14.7% increase in the number of instruments calibrated in 1985 over that of 1984. Details for each service unit rendering calibration and metrology services are shown in Table 3.

The Cagayan de Oro Regional Station started operations in November 1984 and provides volume and mass calibration services to the whole Mindanao area. The operationalization of the station was a boon to industries in the area as it provided independent test services which were previously available only in the Visayas and Manila.





are many small and medium scale food processing firms in the area. The project was funded by the PCIERD.

Certificates of Manufacturing Formula are documents required by the Bureau of Customs and the Board of Investments from exporting firms in order for the latter to avail of tax drawbacks. These are issued by the NSTC after inspection of the exporter's manufacturing facilities and the determination of raw material to finished product formula ratios.

In 1985, 326 certifications were issued. Fees collected for the certification including metrology services totalled P336,305.10 which was a 2.6% increase over that of fees collected in 1984.

The number of parts, instruments and equipment for scientific applications which were fabricated or repaired at the NSTC increased substantially in 1985.

This reflected a growing recognition for the Institute in this regard. The total income from the activity came to P76,656.17 which was 01.1 percent increase over that of 1984 income.

The total number of requests for repair or fabrication by outside agencies which were accommodated this year was 1,361. In addition, 1,377 similar requests for instruments which are used in the various R & D projects of the Institute were repaired by the NSTC. Savings resulting from this was estimated to be worth P44,618.

## RESEARCH AND DEVELOPMENT

Income derived from the various technical services of the NRDC increased substantially in 1985. The total income for the year totalled P95,595.52 which was 33.3% higher than 1984's. Details are given in Table 5.

The sale of "nata", vinegar, and mushroom starters increased in 1985 with an income which is 22.1% higher than the preceding year. The sale of copies of the *Philippine Journal of Science*, the *NIST Journal*, and other publications also reported an increase of 26.9%.

The rental of some equipment of the NIST by a coconut processing company in Laguna was an agreement reached after the successful termination of a joint R & D cooperative venture. The project involved pilot plant scale technical and feasibility studies on the production of coconut "gata". The equipment used was fabricated by the Engineering Research Program prior to the unit's transfer to the CRDC.

\*\*\*

The various test and analytical laboratories of NSTC

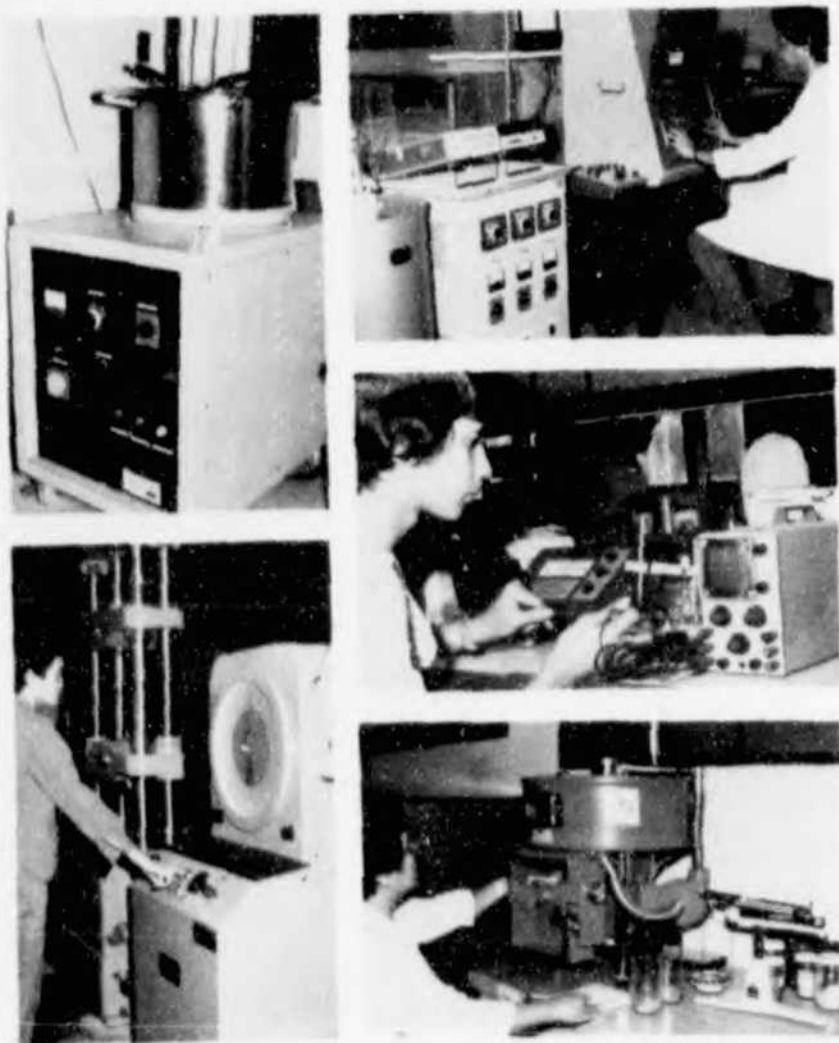


Table 1. 1985 Income from NSTC's Technical Services Rendered of the NSTC as Compared with the 1984 Income

Type of Service	1985 Income	1984 Income	% Increase
Testing & Analyses & Sale of Laboratory Animals	P 894,687.37	P 516,419.10	73.2
Calibration & Metrology Services & Manufacturing Formula Certification	336,305.10	327,902.43	2.6
Repair and Fabrication of Scientific Equipment	76,656.17	38,118.00	101.1
<b>TOTAL INCOME</b>	<b>P 1,307,648.64</b>	<b>P 882,439.53</b>	<b>48.2</b>

Table 3. No. of Instruments Calibrated in each Metrology Service Unit and Comparison with the Past Year's Volume

Service Unit	No. of Instruments Calibrated 1985	1984	% increase/ (Decrease)
Mass/Engineering Metrology	816	723	12.9
Volume Calibration	1,430	1,476	(3.1)
Moisture Meter Calibration	135	185	(27.0)
Mechanical Testing	233	180	29.4
Electrical/Electronics Calibration	100	30	233.3
Cebu Regional Station	254	100	60.6
Iloilo Regional Station	42	98	(57.1)
Cagayan de Oro Reg. Station	151	*	
Technical Support	41	*	
<b>TOTAL</b>	<b>3,202</b>	<b>2,792</b>	<b>14.7</b>

\*First full year of operations in 1985

Table 4. No. of Certifications of Manufacturing Formula Issued By Each Department

Department	No. of Cert. Issued
Electronics and Acoustics	62
Mechanics and Optics	
- Paper and Textile	97
- Polymer and Leather	84
- Mechanical Testing	7
- Engineering Metrology	36
Chemistry	40
<b>TOTAL</b>	<b>326</b>

Table 5. Income Derived from the Technical Service Operations of the NRDC and TIDD

	Income 1985	1984	% Increase
Starters ("nata", vinegar, mushrooms, & other microbiological organisms)	P28,837.50	P23,612.45	22.1
Philippine of Science & other NIST publications	42,758.02	33,698.81	26.9
Contract research	24,000.00	14,415.10	66.5
<b>TOTAL</b>	<b>P95,595.52</b>	<b>P71,726.36</b>	<b>33.3</b>

Some samples being tested/analyzed at NSTC

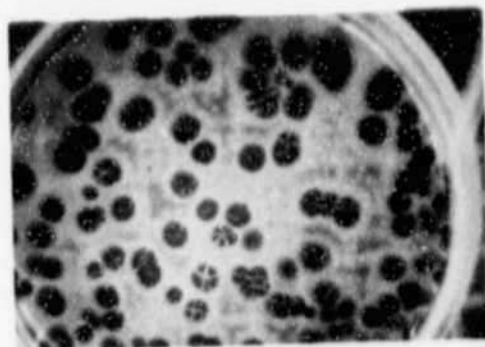
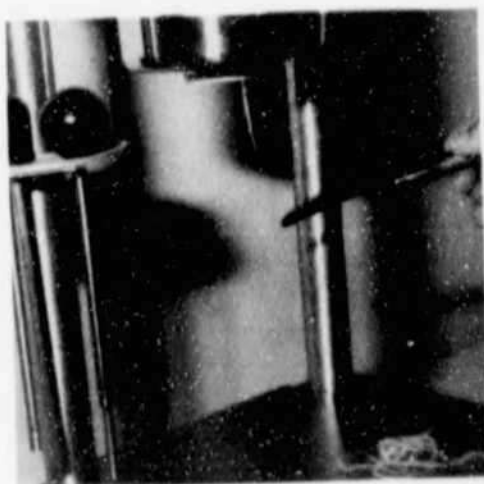


Table 2. Number of Samples Tested/Analyzed in 1984 and 1985

Laboratory	No. of Samples Tested 1985	1984	% Increase/ (Decrease)	Typical Tests Undertaken
Organic Chemistry & Food	619	507	22.1	proximate & ultimate analyses, characterization & identification of organic compounds, residue & analysis, performance/efficacy tests.
Metals & Alloys	646	431	49.9	chemical tests of chromium, aluminum, lead, etc.; corrosion resistance testing of metal coatings; trace analysis of metals.
Water Chemical Analysis	384	327	17.4	physical & chemical analysis of industrial & domestic water samples including wastewater; analysis of "calamansi" concentrate for turbidity.
Water Microlab	2,139	2,041	4.8	microbiological testing & evaluation of water, food, cosmetic raw materials & products, germicides etc.; tests for resistance to microbial attack of paper, rubber, etc.; BOD determinates of wastewater; sterility tests; efficiency determination of bacteria filters.
Fuels & Petroleum	501	373	34.3	physical testing and chemical analysis of petroleum fuels & special products.
Paints, Ink & Allied Products	211	130	62.3	physical testing & chemical analysis of ready-mixed paints, ink, gum copal, varnish, pigment dispersion, water proofing compound; applied/coated panels, etc.
Minerals, Ores, Fertilizers, etc.	529	455	16.3	chemical analyses of fertilizer, mineral, seaweed, etc. samples.
Polymers & Leather	427	320	33.4	physical testing & chemical analysis of plastics, rubber, leather & polymers.
Paper & Textile	1,856	2,280	(18.6)	physical testing & chemical analysis of pulp, paper products & textile.
Analytical Equipment	337	*	.	HPLC analyses of glycerine, paper board aspirin, molasses, etc. samples; molecular weight determination by GPC.
Biological & Toxicology	5	**	.	safety, sterility & toxicity tests of various product samples.
TOTAL	7,654	6,864	11.5	

\* started operations in 1984

\*\* transformed into a technical service unit in late 1984 only

# PLANNING AND PROGRAMING

The PPD continued to carry out its role in providing the necessary support services to management in relation to policy and program formulation, project evaluation/monitoring, assessment and delivery of developed technologies, budget planning and preparation of financial reports.

## Planning and Evaluation Section (PES)

In line with the concept of participative planning, the PES consolidated, reviewed and integrated the Operation Plans of the various centers/divisions and came up with the Institute's Plans for 1985. It also assisted in the preparation of the NIST Briefing Materials for the Minister's report to the Batasan.

The section also assisted in the regular activities of the Technology Assessment, Delivery and Utilization Section. It participated in the evaluation and preparation of the terminal reports for the five technology transfer projects with industry. It also evaluated the conduct of lectures/seminars on NIST's developed technologies to the rural areas. It participated in several project negotiations particularly for funding purposes. Towards the end of 1985, it prepared the integrated proposal of the project on U.S.P. Grade Dextrose and Sodium Chloride which was proposed for funding to PCIERD and NSTA. The section assisted in the preparation of the organizational concepts for the newly-created Resource Recovery Research Program. The PES was a member of the working group which studied the feasibility of forming an association of planning officers in the NSTA system. The implementation of the Institute's on-going regular and assisted projects as well as

technical services are also being coordinated and monitored by the PES.

## Technology Assessment, Delivery, and Utilization (TADU)

The section continued on with its activities in support of the transfer of the Institute's technologies. The section coordinated with the research programs in six (6) project negotiations. It also coordinated with the NIST-NTRDP, the Science Promotion Institute, and the NSTA Regional Offices in technology demonstration/training projects in non-Metro Manila areas. The section also

### *Technology transfer to the rural areas*





organized some training and technology demonstration programs in various regions such as Central Azucarera de Don Pedro Batangas and San Esteban Ilocos Sur on food processing technologies. All in all, thirty-two (32) requests for training or lecture demonstrations of which 18 (56%) were directly answered. The other requests were referred to the NTRDP.

In response to the numerous requests for such technology demonstration and training, the TADU submitted two proposals for training projects on NIST-developed technologies, one for NSTA Regional personnel and the other, to the general public as a series of low-cost technical training workshops. Pending approval, implementation is targetted early next year.

The TADU also entertained inquiries on technical topics referring the parties

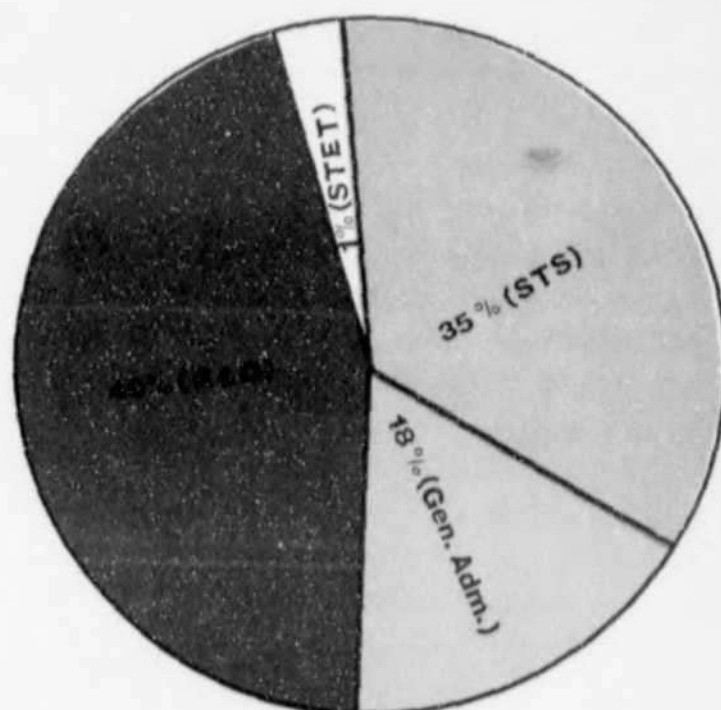
to the appropriate programs when necessary. A computerized off-line database for technical inquiries was designed and developed jointly with TIDD. The database is being utilized to keep tab of the users of the Technical Inquiry Service program of the TIDD.

Other activities of the section in relation to technology transfer included the coordination with the NSTA regarding the setting up of the Technology Utilization Network (TUN) and the preparation of information materials on technologies/research projects upon requests.

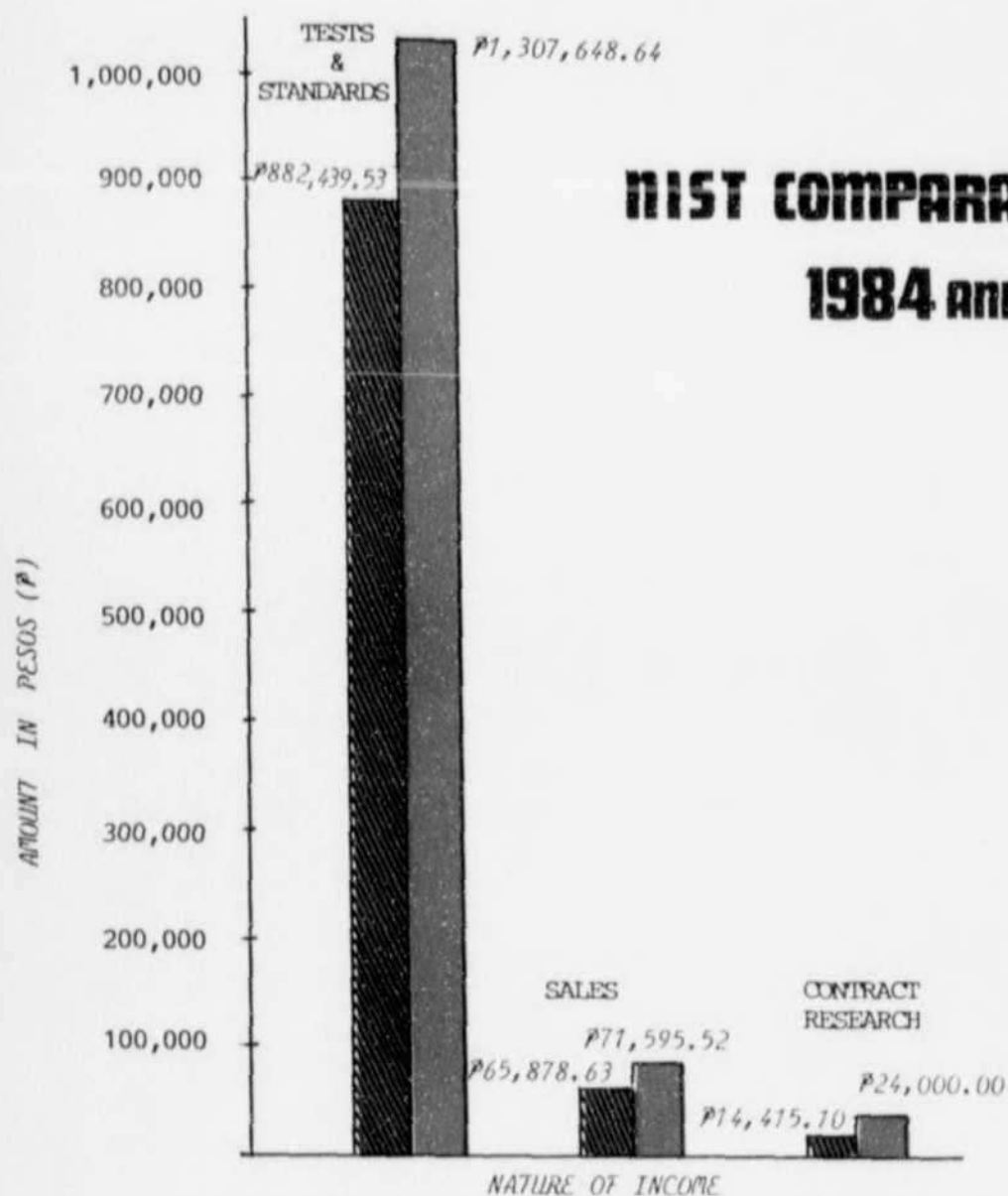
As a form of resource sharing and cooperation, the TADU conducted a study group session on statistical design of experiments at the CRDC for selected personnel. Some data of the CRDC were also referred to the section for statistical analysis.

#### ALLOTMENTS

	Amount	Percentage
Research & Development (R&D)	P 8,732,535.00	46%
S & T Services (STS)	6,641,244.00	35%
S & T Education/ Training (STET)	275,365.00	1%
Gen. Administration	3,469,798.00	18%
	P19,118,941.00	100%

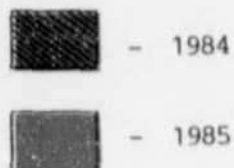


### NIST BUDGET ALLOTMENT IN 1985



BAR GRAPH OF COMPARATIVE INCOMES OF NIST DERIVED IN  
1984 and 1985

Legend:



COMPARATIVE NIST INCOME IN 1984 and 1985			
	AMOUNT		% Increase
	1984	1985	
INCOME SOURCES			
Standards & Testing	P882,439.53	P1,307,648.64	48%
Sales (Publications Starters/Others Cultures)	65,878.63	71,595.52	9%
Contract Research	14,415.10	24,000.00	66%
TOTAL	P962,733.26	P1,403,244.16	46%

# BALANCE SHEET

(As of December 31, 1985)

## GENERAL FUND

### ASSETS

Current Assets:		
Cash	₱ 4,005,636.10	
Receivables	46,945.51	
Inventories	<u>116,747.61</u>	₱ 4,169,329.22
Other Assets:		
Miscellaneous Assets & Deferred Charges	<u>31,160.00</u>	
Total Current & Other Assets		₱ 4,200,489.22
Fixed Assets:		
Land & Land Improvements	₱ 707,876.79	
Equipment & Furnitures	<u>13,313,443.11</u>	
Building & Structures	<u>5,885,231.06</u>	<u>19,906,550.96</u>
TOTAL ASSETS		<u>₱24,107,040.18</u>

### SURPLUS

Current Surplus:		
Per Statement of Operations	(₱ 62,777.66)	
National Clearing Account	<u>( 3,713,372.02 )</u>	(₱ 3,776,149.68)
Invested Surplus:	<u>19,906,550.96</u>	
Total Surplus		<u>₱16,130,401.28</u>
TOTAL LIABILITIES & SURPLUS		<u>₱24,107,040.18</u>

## TRUST FUND

### ASSETS

Current Assets:		
Cash	₱ 5,868,267.85	
Other Assets:		
Miscellaneous Assets & Deferred Charges	<u>16,100.00</u>	
TOTAL ASSETS		₱ 5,884,367.85

### LIABILITIES

Current Liabilities:		
Trust Liabilities	₱ 5,832,097.75	
Guaranty Deposits	<u>52,270.10</u>	₱ 5,884,367.85

### SURPLUS

TOTAL LIABILITIES & SURPLUS		<u>₱ 5,884,367.85</u>
-----------------------------	--	-----------------------

### LIABILITIES

Current Liabilities:		
Payables	₱ 4,281,188.37	
Obligations Incurred in Excess of Allotment	<u>62,777.66</u>	
Trust Liabilities	<u>3,578,702.92</u>	
Obligations Liquidated in Excess of Allotment	<u>( 62,777.66 )</u>	₱ 7,859,891.29
Other Liabilities:		
Miscellaneous Liabilities & Deferred Credits	<u>₱ 116,747.61</u>	
Total Liabilities		<u>₱ 7,976,638.90</u>

## STATEMENT OF OPERATIONS

(As of December 31, 1985)

### SURPLUS AT THE BEGINNING OF THE YEAR:

Overdraft in Allotment		(₱ 597,969.93)
Add: Allotments received during the year:		
Batas Pambansa Blg. 866	₱19,118,941.00	
Terminal Leave	<u>573,607.15</u>	
Retirement Gratuity	<u>145,770.07</u>	<u>19,838,318.22</u>
Total Allotments during the year		<u>₱19,240,348.29</u>
Less: Obligations Incurred during the year:		
Personal Services	₱11,669,084.83	
Maintenance & Other Operating Expenses	<u>7,188,748.12</u>	
Equipment Outlay	<u>445,000.00</u>	<u>19,302,832.95</u>
Excess of Allotment over obligations		(₱ 62,484.66)
Add: Income during the year:		
Operating & Service Income-Government Service	₱ 1,230,972.47	
Operating & Service Income-Rent	<u>10,000.00</u>	
Operating & Service Income-Miscellaneous	<u>57,479.17</u>	
Sale of Assets-Fixed Assets	<u>16,732.50</u>	<u>1,420,697.81</u>
Surplus Adjustments:		
Excess of Certification to Accounts Payable & Reverted Claims RA 3526	₱ 228,235.16	
Stale Checks RA 2527	<u>15,007.14</u>	
Prior Year's Credit	<u>3,061.56</u>	
Others	<u>2,837.75</u>	<u>249,141.61</u>
Total Surplus during the year		<u>₱ 1,607,354.76</u>
Less: Reversions to Unappropriated Surplus:		
Income	₱ 1,420,697.81	
Surplus Adjustments	<u>249,141.61</u>	
Unexpended Balance of Allotment	<u>293.00</u>	<u>1,670,132.42</u>
Surplus at the End of the Year		<u>(₱ 62,777.66)</u>

# GENERAL ADMINISTRATION

## Personnel Section

For 1985, the NIST has a total of 518 employees (417 regular, 24 contractuels, 71 emergency employees, and 2 part-timers/4 consultants). The personnel section processed papers for eight (8) original appointments, one (1) promotion, one (1) transfer from another office, thirteen (13) resignations/terminations from service, and two (2) retirements. Table 1 shows NIST employee movement.

A total of 3,917 sick/vacation, 18 maternity, and 3 terminal leave applications were processed. The time-keeper unit printed 4,390 timecards for NIST personnel used from January-December 1985. A total of 73 senior personnel rendered required rural services within the year.

## Staff Development

To upgrade its manpower capabilities, NIST sent its officials and employees to 40 foreign and 65 local seminars, meetings and training courses. Table 2 shows the NIST staff development activities here and abroad. The NIST also granted a total of 21 part-time scholarships, 20 leading to MS degrees in various S & T fields, and one (1) doctoral degree. Table 3 shows the list of recipients, courses, distribution and school of NIST part-time scholars.

## Honors and Awards

Twenty (20) outstanding employees from the NIST support staff received monthly incentives and rewards through the help of IRF. From this total number, the Employee of the year was chosen. Table

4 lists the 1985 monthly incentive award-ees from various NIST offices.

The NIST also recommended six personnel to the 1985 Kapwa Award and one to the 1985 Lingkod Bayan Award sponsored by the CSC. The Kapwa awardees were: Leonora Vilela (NRDC), Ma. Divina Alcasabas (NRDC), Asunción Félix (NRDC), Amparo Orijuela (Adm.), Noel Conoza (NRDC), and Virgilio Aurelio (TIDD). The 1985 Lingkod Bayan award went to Milagros A. Ramos (NRDC).

Six (6) employees received in 1985 major awards given by various institutions outside NIST. They were: Dr. Filemon A. Uriarte, Jr. - Outstanding Alumnus in Chemical Engineering (UP), and NRCP Achievement Award; Olympia N. Gonzalez - Outstanding Woman Inventor (WIPO); Ronald M. Henson - Outstanding S & T Information Officer (SPI); Milagros A. Ramos - Outstanding Award in Pharmaceutical Research (UST); and Irma Castro/

*NIST director congratulates outstanding employee*





Jesus Hiroy - Outstanding Employee Award (NSTA).

Three scientific papers received the IRF research awards as follows: "Biogas Production from Distillery Slops Using an Upflow Anaerobic Filter Reactor" (first prize), "A Study of the Factors Affecting Surface Culture Production of Citric Acid from Cane Sugar by *A. niger*" (second prize); and "Studies on the Storage Properties of Dried *Hasa-Hasa* Packed in Plastic Films" (third prize). Also, seven (7) NIST research chairholders delivered their lectures on the various fields of science and technology. Table 5 lists the speakers and lecture topics.

#### Property Section

The procurement unit prepared and processed at total of 950 RIV's, 416 abstracts of special canvass, 1,039 purchase orders (PO's), 809 of which are approved, and 809 disbursement vouchers. In the storage and issuance unit, a total of 390 deliveries were received as per approved RIV's, consisting of office and laboratory supplies. There were 950 PO's, 1,050 requests for inspection, and 45 gate passes processed. The inventory and disposal unit prepared 223 memorandum receipts, 271 ledger cards, and 62 clearance certificates. There were 90 work orders submitted, but only 27 were approved and served, which 41 requests for pre-inspection report were attended to.

#### Records Section

The section handled 8,391 incoming documents, and released 10,600 letters, publications, packages, and other communications. It also mimeographed 2,103 stencils, reproduced 956 copies of trip tickets, permit slips, RDA forms, project proposals, reports, memo, special orders; and sent 176 telex/cablegrams/telegrams

to different countries and provinces.

#### Clinic and Dental Section

A total of 2,826 NIST and 862 NPCC employees and their immediate families were treated during the year. The dental clinic attended to 1,270 oral and dental cases.



*The clinic and dental services*

#### Maintenance Section

The carpentry and plumbing unit renovated the office of the Director at Bicutan, as well as other rooms and laboratories, repaired and fabricated office tables, chairs, bookshelves and cabinets,

constructed the room at the Animal House in Bicutan, and undertook the painting of rooms and varnishing of cabinets. One unit of water pump, 20 pieces of Gi pipes, 35 water closets, 24 faucets and 6 laboratory sinks were repaired and installed.

The electrical unit repaired and replaced 65 fluorescent lamps, 30 incandescent bulbs, 50 ballasts, 6 safety switches, and 15 outlets; and installed 5 telephone lines at the NIST compound.

### Collecting and Disbursing Section

The NIST collected a total of P4,761,347.37 made up of checks and cash deposited with PNB Ermita for the NIST treasurer's checking account. From this amount, P3,232,805.95 were financial assistance funds representing grants-in-aids from different agencies, P96,587.62 income from operation and

services, rentals and miscellaneous, P155,719.98 income from calibration, and P181,683.24 amount refunded from unused cash advances, IOTs and salaries from General Fund, Assisted Projects, Trust Funds and Prior Years Credit, P16,488.50 from payments for lost equipment of retirees, P13,615.10 from Accounts Receivables, P988,504.49 income of NSTC coming from payments of analysis, and calibrations, P9,760 from repairs of moisture meters and P66,182.49 income of SID.

Disbursements during the period amounted to P18,674,534.86 of this amount P13,542,213.88 went to salaries, wages, stipends and honoraria, while the amount of P5,132,320.98 went to supplies and purchase of equipment, operation expenses and other incidental obligations of NIST. Number of checks issued totalled 4,480 for the General Funds, and 1,174 for the Assisted Projects.

Table 1. **EMPLOYEE MOVEMENT**

#### Original Appointments:

Name	Position	Effectivity	Center/Div.
Juventino Iglipa	Sup. Mgt. & Audit Analyst	5-16-'85	O.D.
Cipriano Labez, Jr.	Driver	6-1-'85	O.D.
Renato Malabiga	Field Electrician	11-4-'85	Adm.
Dante Laguimun	Science Aide	11-4-'85	TIDD
Rodrigo Geneta	Utility Man.	11-4-'85	NSTC
*Lolita Ofrin	Sc. Res. Asst. I		CRDC
*Reynaldo Hernandez	Sc. Res. Asst. I		CRDC
*Linda Nora Oril	Sc. Res. Tech. IV		NSTC

\*Still in process

#### Promotion:

Name	Position	Effectivity	Center/Div.
Teodoro Sevilla	Sup. Mgt. & Audit Analyst to Sr. Dev. Project Coordinator	3-1-'85	PPD

#### Transfer from Another Office:

Grace Pulvera	Training Officer to Sr. Planning Officer From PhilVoics to NIST	11-18-'85	PPD
---------------	---	-----------	-----

#### Resignation:

Name	Position	Effectivity	Center/Div.
Pablo Martuz	Driver	9-23-'85	Adm.
Ma. Gilda Doce	Sc. Res. Spec. I	11-18-'85	NSTC
Carmen Barrientos	-do-	9-23-'85	NSTC
Antonio de Sales	Sc. Res. Asst. II(T2)	3-19-'85	NSTC
Terresita Gan	Sc. Res. Spec. I	3-26-'85	NSTC
Jose Villa del Rey	Sc. Res. Spec. I	12-31-'85	NRDC
Gerardo Garing	-do-	6-15-'85	NSTC
Bernardo Senica	-do-	10-1-'85	CRDC
Marietta Endaya	Cash-Clerk		Adm.

#### Terminated:

Name	Position	Effectivity	Center/Div.
Cesar Cortez	Driver	5-31-'85	Adm.
Eduardo Valisto	Sc. Res. Tech. IV (SRSI)	5-5-'85	NSTC
Roberto Nepomuceno	Sc. Res. Asst. I(TI)	4-9-'85	NSTC

#### Dropped:

Alex Reyes	Field Electrician	1-1-'85	Adm.
------------	-------------------	---------	------

#### Retirement:

Noel Balitactac	Sup. Sc. Res. Spec.	5-8-'85	NRDC
Francisco Dalusong	Science Aide	4-1-'85	NSTC

# Table 2. SEMINARS/ TRAININGS ATTENDED

NIST Personnel Attended Foreign Seminars-Workshops/Training

Name	Title	Place/Date	Name	Title	Place/Date
Dr. Filemon A. Uriarte, Jr.	55th Congress of the ANZAAS - The EIS System: Its Relevance to Phil. Government	Melbourne, Australia Aug. 26-30, 1985		ASEAN-Australia Meeting on Biotechnology & 4th Natl. Congress of the Indonesian Society for Microbiology & The 1st Meeting of ASEAN Microbiologist	Singapore & Indonesia, Nov. 29 to Dec. 5, 1985
	Intl. Symposium on Clean Technologies - Metal Finishing & Coating in ASEAN: Current Practice & Future Prospects for Clean Tech.	Karlsruhe, Federal Rep. of Germany Oct. 7-18, 1985	Eulalia L. Venzon	British Council Prospectus Course 526 on Human Toxicology: Present Problems & Future Approaches	Brighton, England May 12-14, 1985
	ITIT Symposium on Intl. Research & Dev. Cooperation: Present & Future Prospect	Tsukuba, Japan Dec. 2-10, 1985	Pilar G. Anglo	7th Intl. Conference on Alternative Energy Sources	Miami Beach, Florida U.S.A. Dec. 11-14, 1985
Mercedes R. Soriano	Senior Management Course	Canberra, Australia March 4, 1985	Blanquita B. de Guzman	UNESCO Regional Workshop on Application of Microbial Protoplasts in Genetic Manipulation & Genetic Engineering	Hongkong July 4-13, 1985
	8th Meeting of the ASEAN - FTRD Working Group	Thailand Sept. 23-27, 1985	Mario Aguinaldo	Training Course on Design of Cutting Tools	India July 4 - Aug. 21, '85
	13th COST Meeting	Bangkok, Thailand Nov. 4-10, 1985	Ursula Guce	Training Course in Biotechnology	Japan May 1985
	Review Team for the ASEAN - FTRD Projects in the different ASEAN Countries	March 3 - April 1 1985	Josie Pondevida Delfin Pugal	Training on Feasibility Study on the Establishment of Powder Activated Carbon in the Phils.	Japan May 1985
	12th Meeting of the ASEAN-COST	Brunei, Darussalam		Individual Training Course on Charcoal & Activated Carbon Production	Yokohama & Sapporo, Japan June 13 to Nov. 12, 1985
Olympia N. Gonzalez	ASEAN-Australia Experts Meeting on Materials Processing	Melbourne, Australia Sept. 7-13, 1985	Felino Cueto	Guest Worker on ITIT Project	Japan Feb. 8, 1985 (50 working days)
	14th Meeting of the ASEAN Working Group on Food Waste Materials	Bangkok, Thailand Sept. 23-27, 1985	Alberto Caballero	Invitation of the Govt. of Japan - GIDLH Inst. for Transfer of Industrial Technology	GIDLH, Sapporo City Japan July 31 - Oct. 28, '85
	BIOTECH '85 Asia	Singapore Nov. 27-28, 1985		Research Fellowship on the Production of Slow Release Fertilizer from Phil. Dolomitic Limestone & Rice Husks	
Violeta P. Arida	7th Intl. Conference on Alternative Energy Sources	Miami Beach, Florida U.S.A. Dec. 11-14, 1985	Romeo Cabacang	Intl. Centre of Cooperative Research & Dev. in Microbial Engineering	Osaka, Univ. of Japan August 1-30, 1985
Felicidad E. Anzaldo	5th Intl. Symposium on Medicinal and Aromatic Plants	West Bengal, India Feb. 23-26, 1985		ASEAN Workshop on Biochemical Engineering	Thailand Sept. 23-27, 1985
Claro M. Santiago, Jr.	ASEAN S & T Training Program for Middle Level Managers Course	Australia March 4 to June 3, 1985	Divina Alcasabas	1st ASEAN Workshop on Food Technology Research & Development	Bangkok, Thailand Sept. 23-27, 1985
Ernesto S. Luis	Process Improvement Working Group Meeting	Bangkok, Thailand Feb. 4-7, 1985	Marilyn Usita	Group Training Course in Chemical Technology	Tsukuba, Japan Sept. 6, 1984 to Sept. 5, 1985
	ASEAN S & T Training Program for Middle Level Managers Course	Australia March 4 to June 3, 1985			
Lydia M. Joson	ASEAN-Australia Experts Meeting on Technology	Melbourne, Australia Aug. 26-30, 1985			

Name	Title	Place/Date
Carmelita Hernandez	Group Training Course in Chemical Technology	Tsukuba, Japan Aug. 29, 1985 to Aug. 28, 1986
Erlinda Legaspi	Microbiology in the 80's Intl. Union of Micro Societies	Singapore May 20-22, 1985

#### NIST Personnel Attended Local Seminars-Workshops/Training

Nellie Balgos Josefina Manalo Teresita Bonifacio Merle Villanueva	Seminar on Korean Ginseng by Dr. Han	U.P. Diliman May 23, 1985
Jose Bautista, III	PAFT Annual Convention	PICC Nov. 27, 1985
	Tarlac Service Fair	Tarlac Feb. 21-22, 1985
	Food Conference '85	PICC Feb. 18-23, 1985
	1st Natl. Workshop on Food Composition, Data Generation Compilation and Use	CEC-UPLB Jna. 14-17, 1985
Teresita Bonifacio	Protoplast Fusion of Filamentous Fungi	NSTA Executive Lounge Jan. 7, 1985
	Seminar on Alcohol Production by E. coli	NIST Aug. 20, 1985
Rosalinda Torres Elvira Bulanagui Teresita Bonifacio Evangeline Monroyo Merle Villanueva	Lecture on Vermiculture	NIST Library Jan. 29, 1985
Violeta Coronel	Technology & Application of Wastewater Treatment	SID Conf. Rm. Nov. 15, 1985
Violeta Coronel Felicisima Unalivia	IRF Lecture-Seminar: Studies on the Aqueous Processing of Coconut Utilization of Its By-products	SID Conf. Rm. June 4, 1985
Felicisima Unalivia Rosalinda Torres Elvira Bulanagui Violeta Coronel Teresita Bonifacio Josefina Manalo Gloria Ponciano Merle Villanueva Rosario Genato	IRF Lecture-Seminar on Essential Oil Technology & Its Industrial Application	Adamson Univ. Sept. 26, 1985
	Consultative Meeting on Feasibility Studies for Coconut Flour	NFAC May-June 1985
	Consultative Meeting Re: "Quality Control in the Fruit & Vegetable Processing Industries" Manual by Peter Board of CSIRO	Bicutan May 30, 1985
	Symposium on Food Processing for Export	

Name	Title	Place/Date
Josefina Manalo	Lecture on Pectin Production	Oriental, Mindoro Aug. 12-16, 1985
Gloria Ponciano	Genetic Manipulation of Yeasts for Improved Alcohol Fermentation Technology	UST Graduate Aug. 17, 1985
Erlinda Punzalan	Improved Technology on Soy Sauce Making	PWU Nov. 22, 1985
	Symposium on Packaging of Processed Foods for Export	Philtrade Nov. 11, 1985
	Lecture-Seminar on Thermal Analysis	NSTC Sept. 18, 1985
C. B. Samson	Seminar on Alcohol Production	NIST Library Aug. 20, 1985
R. Sonsing Erlinda Punzalan	ASEAN Food Conference '85	PICC, Manila Feb. 18-22, '85
R. Sonsing	The Technology of Animal Feed Production Utilizing Food Waste Materials	NSTA Executive April 4, 1985
	Protein Chemistry	SID, Bicutan Sept. 9, 1985
	Thermal Analyzer	SID, Bicutan Sept. 18, 1985
	Application of Genetics for the Improvement of Industrial Micro-organisms	SID, Bicutan Nov. 22, 1985
	Hybridization of <i>Saccharomyces cerevisiae</i> by Transformation Associated Cell Fusion	SID, Bicutan Nov. 22, 1985
R. Sonsing	Improved Technology of Soysauce Production	PWU Nov. 22, 1985
R. Sonsing M. Villanueva	IRF-Seminar-Studies on Aqueous Processing of Coconut & the Utilization of its By-Products	SID, Bicutan June 4, 1985
F.E. Unalivia	Technology and Application of Wastewater Treatment	SID, Bicutan Nov. 15, 1985
M. Villanueva	Antifertility	SID, Bicutan May 30, 1985
F. V. de Vera	Lecture-Demonstration on Medicinal Plant Preparations & Utilization	Azucarera de San Pedro March 1985
F.V. de Vera J. B. Manalo	Seminar-Workshop of the Ermita Science Community	Manila Midtown Hotel July 10, 1985
Ofelia Atienza Alberto Caballero	National Symposium on Renewable Energy Technologies	Manila Garden Hotel Nov. 5-7, 1985



Name	Title	Place/Date
	Technical Symposium on Transfer of Indigenous Technologies	NSTA Ex. Lounge July 9, 1985
Florencia S. Cubol Reynaldo Esguerra	Training on "Leather Processing Technology"	BAI, Marulas, Valenzuela, MM Feb. 26 to March 26, 1985
Milagros Santos Juanito Garing	Supervisory Development Course	NSTA Aug. 19-23, 1985
Emilia Divino Teresita Manuel Anselmo Quinlog	Training Program for Personnel Management	NSTA Sept. 9-13, 1985
Felicidad Anzaldo Pura Anionuevo	Government Training Officers Assoc. of the Phils. Natl. Conference	PICC Aug. 7-9, 1985
Ligaya Parawan	Seminar on the Problem of Filth Contaminants in Foods for Export: Nature, Analysis & Control	FTI Oct. 28, 1985
Apolonia Enriquez	49th Annual Convention and Scientific Meeting	Manila Hilton Sept. 6-8, 1985
Rolando Romero Teresita Artuz	1st Intl. Records Management Congress	PICC & Manila Hotel Nov. 18-22, 1985
Aurelio Tabornal	Basic Language Programming	CSC-NMYC Oct. 14-Dec. 14 '85
Rosendo Flores	Vehicle Maintenance	CSC-NMYC Oct. 5-Dec. 14, '85
Delfin Alvarado	Automotive Engine Mechanics	CSC-NMYC Oct. 5-Dec. 14, '85
Virgilio Suarez	Plumbing	CSC-NMYC Aug. 10-Oct. 12, '85
Marcial Ang	Short Course on Micro computers in Industrial Process Data Analysis	Natl. Eng'g. Center UP Diliman, Q.C. Aug. 12-17, 1985
Onofre Desuyo	Safety Organization of the Phil. Inc. Seminar on program on Land Transportation Safety Mgt.	SOPI Bldg. Mandaluyong, MM 22 Nov. 1985
Delfin Alvarado Armando Oraa Rosendo Flores Romeo Dionisio Cesar Veran		
Marcial Ang Orlando Tomampoc	Seminar on Instrumentation & Control Systems	UP Diliman, NEC Bldg. Jan. 21-25 '85
Jose Bautista III Edwin Palma	Seminar/Workshop on Enhancement Course on Effective Supervision in Research Systems	NSTA Feb. 4-8, 1985
Mariano Batang Alberto Pesigan	Filipino Ideology Course	NSTA May-June 1985

Name	Title	Place/Date
Pura Anionuevo Aida Custodio		
Aida Balagot	Filth Analysis on Processed Foods	USFDA - FTI Oct. 28, 1985
Dolores Isaac Estrella Mamaril	Forum on Mineral Industry	Manila Garden Hotel Nov. 27-29, 1985
Ronald M. Henson	RO-SIAG-RSITAF Area Consultative Seminar/Workshop on Science Information Delivery	Cotabato City Nov. 14-15, 1985
	Second Seminar/Workshop on Planning for the NSTA General Office	Lounge Nov. 19-21, 1985
	Leadership Training Program for Science Club Members "Development Communications: A Strategy for Science Promotion" (as speaker)	Ramon Magsaysay High School Nov. 28-29, 1985
	National Congress for Science Communication	Diliman, Q.C. INNOTECH Dec. 16-17, 1985
Aurea B. Solis	Planning & Implementing on National Scientific and Technological Information Policy	Manila Garden Hotel April 29-30, 1985
	4th Natl. Productivity Congress	Manila Garden Hotel Oct. 24-25, 1985
	Consultative Seminar/Workshop on Information for Health Care	DAP, Pasig, MM Dec. 2-3, 1985
Violeta N. Balaoing	Dissemination of Scientific and Technological Knowledge-Development of Extension Work Programmes	UP Diliman Nov. 17-30, 1985
	11th Series of Seminars on Food and Nutrition Researches	FNRI Auditorium July 25-26, 1985
	Symposium on "Technology Thrusts Towards Productivity	NSTA Exec. Lounge July 12, 1985
Priscilla Bantugan Lilina de Guzman Corazon Quintia Eden Luna Lucita Guevarra Cynthia Vergara	Industrial Corrosion PCIIRD/NIST	NSTA Exec. Lounge Nov. 25-28, 1985

*Table 3.*

## NIST PART-TIME SCHOLARS

Name/Program	Course	School
IMELDA BRIONES	M.S. Entomology	Araneta University
CATHERINE MELO	M.S. Chemistry	U.S.T.
DORIS TENORIO	M.S. Chemistry	Adamson University
(BTD/NSTC)		
LIWAYWAY MAGNAYE	M.S. Chemistry	U.S.T.
(EAD/NSTC)		
IRMA REYES	M.S. Chemistry	C.E.U.
ARLENE RAGADIO	M.S. Chemistry	U.S.T.
NORLITA REYES	M.S. Microbiology	U.S.T.
CONCEPCION GAYOMALI	M.S. Chemistry	C.E.U.
CYNTHIA VERGARA	M.S. Industrial Eng'g.	U.P.
PERCIVAL MYLES GARCIA	M.S. Energy Eng'g.	U.P.
(CD/NSTC)		
CORAZON GUCE	M.S. Chemistry	U.S.T.
OFELIA MAGYANI	M.S. Chemistry	U.S.T.
(CRP/CRDC)		
ELOISA GAÑAC	M.S. Food Science	P.W.U.
DAISY TAÑAFRANCA	M.S. Food Science	P.W.U.
(FRP/NRDC)		
TEODORO SEVILLA	M.S. Pub. Health	U.P. Inst. of
(PPD)		Pub. Health
ANNABELLE VUELBAN	M.S. Chemistry	U.S.T.
ROSALINDA TORRES	M.S. Chemistry	U.S.T.
(PRP/NRDC)		
ERWIN CASARENO	M.S. Chem. Eng'g.	U.P.
(IFP/NRDC)		
LILIBETH HERMOSURA	M.S. Chemistry	P.W.U.
AGRIPINO PIQUERO, JR.	M.S. Math	U.S.T.
(CRDC)		
GLORIA PONCIANO	Ph.D. Biology	U.S.T.
		Full Time

*Table 4.*

## NIST INCENTIVE-AWARDEES

Month	Name	Center/Division
January	BARTOLOME SINDAYEN	NRDC
February	MARIO BIGOL	NRDC
	TERESITA DE SALES	ADM
	VIRGILIO AURELIO	TIDD
March	JESUS HIROY	ADM
	EUGENIO SANCHO	CRDC
April	LUZVIMINDA JACOLBIA	ADM
	NOEL CONOZA	NRDC
May	JUAN BALATUCAN	NSTC
	AMPARO ORIJUELA	ADM
June	HENRY BRILLANTE	NRDC
	AUREA SOLIS	TIDD
July	MAGDALENO MARASIGAN	NSTC
August	ARISTEO MONTEAGUDO*	NSTC
	OSCAR MAGORA	NRDC
September	GENARO JULAO	NSTC
October	ANSELMO QUINLOG	ADM
	QUIRINA MILLAN	PPD
November	RICARDO MANGUNE	TIDD
	JOSE GARCIA, JR.	NSTC

\*Employee of the Year 1985

*Table 5.*

## NIST-IRF CHAIRHOLDERS

Name of Speaker	Subject	Place/Date
DR. ERNESTO S. LUIS	Analytical Method of Standardization As Applied to Local Conditions	U.P. College of Home Economics 29 Nov. 1985
MS. MERCEDES R. SORIANO	Improved Tech- nology of Soy Sauce Production	PWU-Pharmaceutical Sci. Seminar Hall 22 Nov. 1985
MRS. VIOLETA P. ARIDA	Fuels from Coco- nut Oil	NEC Building UP Diliman, Q.C. 18 Sept. 1985
DR. FELICIDAD E. ANZALDO	Essential Oil Tech- nology and Its In- dustrial Applica- tion	Adamson University 26 Sept. 1985
DR. LYDIA M. JOSON	Genetic Manipu- lation of Yeast for Improved Alcohol (Ethanol Ferment- ation Technology)	U.S.T. Graduate School Audio- Visual Room 17 Aug. 1985
MRS. OLYMPIA N. GONZALEZ	NIST Studies on the Aqueous Proces- sing of Coconut and Utilization of Its By-Products	SID Conference Room NSTA, Bicutan 4 June 1985
DR. CLARO M. SANTIAGO, JR.	Genetic Modifi- cation of Industrial Microorganisms By Protoplasts Fusion Technology	NSTA Exec. Lounge 10 Jan. 1985

# TECHNICAL INFORMATION AND DOCUMENTATION

## Technical Inquiry Service (TIS)

For the year 1985, the NIST received a total of 966 technical inquiries on various R & D topics. Of this number, 431 inquiries were focused on food processing (coco-nut foods, fruits, and vegetables), followed by 85 inquiries on soap technology. Table 1 lists the total TIS received in 1985, according to subject and user categories. The major users of TIS were mostly individuals (614), followed by government offices (121), then industry (108), and the least-users were private associations (24).

The reference files for the TIS documents were initially processed and stored in Apple II-E computer. The TIS reference materials sent to inquiries were rated satisfactory to highly-satisfactory by the users as reflected in the feedback forms received



*The microcomputer used in TIS*

*Table 1*

\*TOTAL TECHNICAL INQUIRIES RECEIVED/ANSWERED BY NIST FROM VARIOUS REGIONS ACCORDING TO USERS CATEGORY (January-December 1985)

TOPIC OF INQUIRY AND RESEARCH PROGRAM CONCERNED	INDIVIDUALS	INDUSTRY	SCHOOLS	GOVERNMENT	ASSOCIATIONS	TOTALS
CHEMICAL RES. & DEV. CENTER (CRDC)	105	63	33	44	12	257
Soap Technology	37	17	11	12	8	85
Oil Processing Technology	25	6	4	7	3	45
Integrated Coco Pilot Plant	2	3	-	-	-	5
Equipment Design	4	1	2	2	-	9
Salt Technology	12	17	3	5	-	37
Activated Carbon	12	14	3	10	-	39
Coco Fuel/Energy	5	4	7	3	-	19
Chemical Derivatives	8	1	3	5	1	18
NATIONAL RES. & DEV. CENTER (NRDC)	509	45	96	77	12	739
Fruits/Vegetable Processing	(310)	(20)	(39)	(57)	(5)	(431)
Coco-based Foods Processing	69	8	12	3	2	94
Food Processing: General	38	4	2	7	1	52
Rootcrops Processing	60	6	14	37	2	119
Fermentative Foods	4	-	1	2	-	7
Meat/Poultry Foods	59	-	4	2	-	65
Cereals Processing	58	-	3	3	-	64
Dairy Product Processing	6	2	1	1	-	10
Fish/Fishery Products	4	-	1	-	-	5
	12	-	1	2	-	15
Medicinal Plants	(60)	(2)	(29)	(9)	(1)	(101)
Essential Oils	11	-	4	3	1	19
Cosmetics/Pharmaceuticals Formulations	20	1	5	2	-	28
Pectins, Tannins, Saponins	9	-	6	-	-	15
Agar, Carrageenan	11	1	7	2	-	21
Phytochemistry	7	-	6	1	-	14
Pigments, dyes from plants	1	-	1	-	-	2
	1	-	-	1	-	2
Alcohol	(82)	(20)	(25)	(9)	(4)	(140)
Mushroom	15	4	9	1	-	29
Vinegar	16	8	2	5	1	32
Antibiotics	30	3	10	-	2	45
Culture Collections	8	3	2	-	1	10
Citric Acid	8	3	2	-	1	14
	5	2	-	3	-	10
Recycling Technologies	(57)	(3)	(3)	(2)	(2)	(67)
Food Wastes Processing	4	3	1	-	-	8
Biogas	4	-	1	-	2	7
	49	-	1	2	-	52

\*Grand Total Inquiries

CRDC	105	63	33	44	12	257
NRDC	509	45	96	77	12	739
	614	108	99	121	24	996

by NIST. A bibliographic citation of these references was prepared, and the final document-report on TIS will be prepared. A proposal on the computerization of TIS has been submitted to UNESCO for approval.

#### Public Relations and Media Linkage

A total of 40 NIST press releases were sent to various print media. About 350 news items were published, monitored, and clipped from the national dailies and provincial newspapers.

Several NIST food processing technologies were arranged, coordinated, and featured in radio-TV stations, namely: fish meat and chicken product and 'guyabano' juice processing in "Tuklas Pinoy" TV Ch. 4; and instant 'tokwa' making in "Subukan Natin" radio DZCA.

A press dialogue a La 'Kapihan-style' held at the National Press Club, 26 September 1985 was sponsored by NSTA, with NIST director as guest. Technology transfer activities and contract researches were highlighted during the dialogue.

#### Exhibits and Special Media

To showcase NIST products and processes and technical services, the TIDD participated in photo blow-up exhibits held at: 1) UP College of Engineering (Diamond Jubilee) Foundation Day, June 10-14, 1985, 2) Tsukuba Expo '85, May-Sept., 1985, and 3) Productivity Congress '85, 14 Oct. 1985, Manila Garden Hotel.

The NIST was commissioned by the PCRDF to prepare blow-up photo/product exhibits focusing on five (5) selected NIST coco processing technologies (coco soap, coco fuels, coco 'gata', coco juice, and coconut coir dust activated carbon). The exhibits also featured miniature models of coconut processing equipment, technology description, and costing.

The NSTA Regional Offices III (Pampanga), IX (Cagayan de Oro), and XII (Cotabato) were assisted by NIST-TIDD in the preparation of photo blow-up exhibits used for science promotion in these regions.

The TIDD prepared and published five (5) NIST print ads in various proceedings and journals of Rotary Club Q.C. Seaweed Industry Association of the Phils., IOWA State University Alumni Association, *Medalya ng Karangalan* Awards, and UP College of Home Economics.



*NIST-PCRDF joint project on exhibits*

#### Information Support to Techno-Transfer/Seminars

The TIDD disseminated how-to brochures and other materials as information support to NIST techno-transfer activities in San Esteban, Ilocos Sur, (Oct. 10-11, 1985) and Central Azucarera de San Pedro, Nasugbu, Batangas (March 18-22, 1985).

Also rendered support activities to the seven (7) lecture-series sponsored by the IRF, particularly in printing the program-invitations, preparing press releases, and participating in the lecture-programs as moderator; to the UNESCO and ASEAN-EEC workshops in documenting the proceedings; and to the Staff Development Committee in organizing and coordinating the four (4) series of seminars sponsored for NIST employees.



## Journals and Other Publications

The TIDD updated the NIST Today brochure which included the 3 technical centers (NRDC, NSTC and CRDC), and published the brochures of the respective R & D programs. Six issues of the bi-monthly *NIST Newsletter* were released.

The *NIST Journal* received NSTA financial assistance in the amount of ₱164,000.00 for 1985. Towards the end of the year, the fourth issue was already being prepared. Also, the NIST Diary 1986 was prepared for distribution to NIST employees and friends.

The *Philippine Journal of Science (PJS)*, a purely scientific publication funded by NSTA in the amount of ₱250,000.00, on the other hand, published and circulated Vol. 114 Nos. 1-4 issues, and special issues on "Phil. Ceramic Raw Materials", and "Nitrogen Fixation". The PJS was also

allotted ₱240,000.00 from the NIST General Fund.

In addition, the PJS compiled one set of journal back issues dated from 1906 (100 volumes); another set was processed for use in the NIST library. The PJS hopes to come out with 4 regular issues, instead of 2 issues with 2 combined numbers for 1986.

Total sales of the journal for 1985 amounted to ₱40,251.17 which was deposited at NIST General Funds. Collectibles amounted to US\$217.10 (foreign subscription) and ₱1,602.00 (local subscription).

The distribution of the 1,000 PJS copies per issue follows: Subscription - 127, Direct buyers - 30, Exchanges - 700, and Complimentaries - 117.

The compilation of papers written by NIST director for 1985 was being prepared, and to be published in bookbound form. This will be the second volume of papers written by the Director in his second year reign at the NIST. The first one which was released in 1984 is entitled *Technology Transfer, Energy, and Environment*.

A case-document on the NIST technology transfer experiences with industry was also being prepared, and will be scheduled for release in 1986. This document will focus on the 5 cases of NIST technologies transferred to industry.

*The NIST publications: popular and technical*



## Library and Documentation Services

### Circulation

No. of readers - 5,820

NSTA & Agencies - 550

Students & public - 5,270

No. of publications loaned out -

Reading room - 21,550 books/journals

Inter library loan - 180 books/journals

### Cataloging

No. of publications classified and cataloged  
books - 86 titles

serials - 1,235 (titles)

No. of cards typed and filed - 799 titles

### Indexing & Bibliography

No. of articles indexed - 834 titles

No. of cards typed and filed - 2,500 titles

### Acquisition

No. of publications received

Subscription - 77 titles

Complimentary & exchange - 255 titles

Purchase - 62 books

- amount of subscriptions - P509,442.95

- amount of purchased books - P68,597.35

### Reproduction

No. of print copies - 161,187 sheets

Ordinary stencils - 132 sheets

Electronic stencils - 332 sheets

No. of copies xeroxed - 15,647 sheets

### Bindery

Full bound - 160 books

Pamphlet bound

NIST publications - 250 journals/pamphlets

Outside - 162 journals/pamphlets

Books labeled - 86 books

# 1985 NIST RESEARCH ABSTRACTS

## FOOD TECHNOLOGY PROGRAM

**The Development of Pretzel-Type Snack From Coconut Meal 'Sapal'.** Rosario T. Genato, Nelmarie B. de Leon and Olympia N. Gonzalez

A snack food item simulating the commercially available and popular pretzel was developed utilizing the coconut meal (sapal), a practically waste by-product of the wet processing of coconuts. Analyses showed that the sapal contains 58% moisture, 17% fat, 2.46% protein and thus, could be converted into food for human consumption. The developed coco sapal pretzel has the following nutrient composition: 7% protein, 19% fat, 1.9% ash, 70.1% carbohydrate and 479.36% mg calcium/100 g sample. An adult and a nursery panel evaluated the product and both found it acceptable. Sorption isotherm and storage studies were carried out and results indicate the need for laminates of PE (polyethylene)/foil and/or cello as packaging material to assure maximum protection of the pretzel from moisture vapor for a targeted 6-month storage at ambient conditions.

**Sorption Isotherm Characteristics and Storage Stability of Instant Soy Tokwa.** Erlinda J. Punzalan, Olympia N. Gonzalez and Maria Ava F. Holazo

The moisture sorption characteristics of instant tokwa were determined by the Weight Equilibrium Method. The critical moisture content and the moisture content at the danger point were found to be 9.52 and 8.85%, respectively. Based on these data, the maximum water vapor transmission rate (WVTR) was calculated to be 3.98 gm water vapor/m<sup>2</sup>-day at 30°C and 90% RH gradient would be very suitable for this type of product. High density polyethylene (PE) packaging material with WVTR value of 5-10 gm/m<sup>2</sup>-day was used in the shelf life studies in view of the closeness of its WVTR value to PVC besides being cheaper and readily available. Its use for instant tokwa stored at ambient temperature conditions of 28°-30°C could meet the required protection of this product within the time frame considered in this study and that is 6-months at high temperature conditions, deterioration due to moisture loss and lipid oxidation will ensue at a faster rate despite the use of high density PE packaging materials.

**Stability of Coconut Milk Treated With Different Levels of Emulsifying Agents.** Rosario T. Genato and Olympia N. Gonzalez

This study was aimed at evaluating sodium caseinate along with other emulsifiers produced by the NIST's chemical research program in a model system of whole coconut milk. Whole coconut milk samples were emulsified with sodium caseinate, Atmos 150, Span 60, and CRL monoglyceride developed by NIST. Test for stability was done on all samples. Results showed that sodium caseinate and Atmos 150, optimum levels of use at 0.5 and 1.0%, respectively, were most effective. Closely related to stability indices obtained were results of the fat globule size measurement.

**Establishment of Thermal Processes and Storage Studies of Shrimp and Tuna *Adobo*.** Teresita S. Palomares, Mryna P. Fajardo, Joyce Cheng and Levi D. Ronquillo

Acceptable recipes in the preparation of canned shrimp and tuna *adobo* have been developed by a series of formulation tests. The canned products were subjected to thermal death time studies and heat penetration measurements. Based on the values obtained on the two determinations, the minimum processing times at 115.6°C and 121°C for four different can sizes were calculated.

Storage studies conducted on the two products over a one year period indicated that it remained stable based from the physico-chemical and microbial standpoint. With this result, application of the minimum process, thus assured a sound product which would remain stable for at least one year and in all probability for longer storage periods.

**Standardization of Canning Procedures for Tulingan (*Auxis Thazard* Lacpede) and the Utilization of its By-Products.** Teresita S. Palomares, Maria Cecilia M. Caparros, and Olympia N. Gonzalez

Eight canned tulingan products namely tulingan in oil, tulingan in brine (chunks and flakes), smoked tulingan (loin and whole pack) in oil, spiced tulingan, smoked spiced tulingan and tulingan with vegetables were developed by a series of formulation studies, heat penetration measurements, thermal death time tests and



process calculation. Storage studies of canned *tulingan* in oil, *tulingan* in brine and smoked *tulingan* (loin pack) over a one year period indicated that the calculated minimum processing time utilized in the thermal processing of the canned products were adequate to prolong the shelf life of the products.

By-products in the canning process of *tulingan* were converted into fish sauce (patis) and fish meal. Physico-chemical and organoleptic tests revealed that good quality fish sauce will be obtained from the viscera. Heads, bones and fins from *tulingan* yielded a fish meal of high protein content (55%).

**Studies on the Storage Properties of Dried *Hasa-Hasa* (*Rastrelliger Brachysomus*) Packed In Plastic Films/Laminates.** Olympia N. Gonzalez, Leonisa M. Tanyag, Teresita S. Palomares, Editha J. Meimban and Levi D. Ronquillo

The performance of polyethylene (PE), oriented polypropylene (OPP), polyester/polyethylene (PET/PE), and polyester/foil/polyethylene (PET/Foil/PE) as packaging materials for dried *hasa-hasa*. (*Rastrelliger brachysomus*) stored at varied temperature conditions was evaluated. PE and OPP did not protect the dried fish from mold growth at 28°C-32°C and 15°C-17°C. PET/PE and PET/Foil/PE laminates performed better as so evidenced by delayed mold growth at these temperatures of storage. Irrespective of packaging materials used, dried fish were protected from mold growth at 3°C-5°C even up to the six month experimental storage period. The use of PET/PE films is being recommended due to its transparent characteristics and lower cost compared with PET/Foil/PE laminate.

**Technology Transfer To the Food Industry - The NIST Experience.** Jose G. Bautista III and Milagros A. Ramos

This paper traces the developments in the transfer of technology in food by the National Institute of Science and Technology (NIST) to specific end-users.

The transfer of technology to the rural areas was done through modules when the project "Technology Transfer for Rural Development" was implemented in 1984. Simplified techniques in food processing were disseminated through lecture demonstrations and distribution of brochures to interested residents. Much interest was manifested among the residents to engage in backyard food processing.

As early as 1965, efforts to develop export products and technologies were undertaken. Two notable products were developed, namely: canned coconut milk and coco sapal pretzels. Both products are presently being exported to several countries.

NIST was reorganized in 1983 to redirect research activities towards technology transfer. Under the NIST

Integrated Technology Transfer Program, mature technologies, of which two are in food, were absorbed by selected existing industrial firms. These are the improved process for soy-sauce production and coconut water beverage processing.

The Industrial Research Foundation (IRF), a non-stock, non-profit corporation affiliated with NIST, provides a close link with the industry. Through the IRF, one long-range contract research with another government office and two short-term researches with private sector were made possible. These projects are: 1) the utilization of cashew apple; 2) the development of local dehydrated spices; and 3) the production of export quality lambanog. Several other food projects are under negotiations through the Foundation.

**Application of SDM in Cakes and Toppings.** Rosario T. Genato and Lourdes T. Solidum

The beverage-type Simulated Dairy Milk (SDM) a product emanating from a PCARRD assisted project has found practical application in two food items namely, cake and topping. The parameters studied in relation to the use of milk indicate that both the SDM and its dairy counterpart could be used interchangeably without adverse effects on the end-products.

**NIST Approach to the Improvement of Community Level Food Processing in the Philippines.** Jose G. Bautista III, Fe Esperanza P. Parian and Milagros A. Ramos.

This paper discusses the strategies adapted by the National Institute of Science and Technology (NIST) in its effort to upgrade community level food processing in the Philippines.

In 1970, the Biotechnological Extension Work in the Rural Areas Project was conceived, wherein research teams disseminated information in Food Fermentation and other preservation methods to rural residents. Lectures, demonstrations and actual trainings resulted in the establishment of a considerable number of small scale enterprises.

Later, Food Processes Demonstration and Testing Centers were established in selected regions in the country. Commercially operational and processing specific commodities, these centers provided added income to the residents and also served as training venues in Food processing for future entrepreneurs.

Transfer of technology to the rural areas assumed a modular approach when the project "Technology Transfer for Rural Development" was implemented in 1984. Simplified food processing techniques were disseminated in the form lecture demonstrations and brochures to the



residents of two localities or modules. The activities generated much interest among the residents to engage in self-reliant backyard industries.

The creation of the Industrial Research Foundation, a non-stock, non-profit corporation affiliated with NIST, whose key objective is to assist in the industrialization of the country provided a closer link with community based industries.

#### **Dehydration / Technologies of Some Philippine Fruits.** **D.E. Tañafranca, L.B. Farre, L.C. Angeles and M.R. Soriano**

The dehydration processes of some fruits to the Philippines, namely: mangoes, papaya, jackfruit and pineapple are presented in this paper. The factors affecting the establishment of standardized procedures for the dried fruits were studied. These include identification of right maturity and degree of ripeness, deterioration of optimum syrup concentration, effect of pre-treatments and addition of food flavorings and/or preservatives to improve the quality and acceptability of the finished products.

In the processing of dehydrated candied papaya, the optimum syrup concentration found suitable was soaking the fruit slices in 50° Brix for three days, adjusting syrup concentration daily to 50°C Brix for. The optimum stage of ripeness was the 4th to 5th day after harvest. Soaking the fruit slices in 0.7% calcium chloride solution prior to syruping was sufficient for preventing softening during the candying process and giving a uniform texture to the finished product.

A standard procedure was developed for dehydrated candied langka (jackfruit). At least 0.2% citric acid was needed to enhance the flavor of the finished product. Addition of 0.1 % sodium metabisulfite was found effective in preventing discoloration of the final product.

A study on the effect of variety on the acceptability of dried mangoes was conducted. Results show that carabao and piko varieties were the most suitable for processing. The Apple and Indian varieties lacked flavor and toughened on dehydration due to the originally weak flavor and fibrous nature of the raw material.

Three stages of maturity were considered in the standardization of procedure for dehydrated candied pineapple. These were the immature, mature unripe and the table ripe. Dried pineapple prepared from table-ripe fruits gave the highest mean scores for all the organoleptic properties tested.

Three hundred day old Starbro broiler chicks were randomly allotted to five experimental diets consisting of five levels of substitution of Rice Bran (RB) with Dried Spent Brewer's Grains (DSBG) as follows: Lot I-0%

DSBG, II-25% DSBG, III-50% DSBG, IV-75% DSBG and V-100% DSBG.

The crude protein and crude fiber contents of the experimented rations increased proportionally with increasing levels of substitution of RB with DSBG.

Performance of the experimental birds in all levels of DSBG substitution did not significantly differ in terms of total body weight gain, feed efficiency and income above feed cost. Nevertheless, it was observed that the group of birds in Lot II at 25% level of substitution of RB with DSBG gave the best performance and the highest profit than all the other treatments.

#### **Utilization of Dried Spent Brewer's Grains as Replacement for Rice Bran in Hog Rations.** Jose G. Bautista III, Romeo M. Ramirez, Mark Anthony L. Hipolito, Flor P. Alfonso and Paul P. Wassmer

Sixteen (16) 30 kilograms hogs were randomly allotted to farm experimental diets consisting of three levels of substitution of Rice Bran (RB) with Dried Spent Brewer's Grains (DSBG) as follows: I-0% DSBG or 100% RB, II-50%, III-100% and a fourth are feed with Commercial BMeg hog mash included as a check.

The crude protein and crude fiber content of the experimental rations increased proportionally with increasing level of substitution of RB with DSBG.

Performance of the hogs in all levels of DSBG substitution did not significantly differ in total body weight gain, feed efficiency, income above feed cost and carcass quality. Nevertheless, it was observed that the group of hogs in Ration III or at 100% level of substitution of RB with DSBG gave the best performance and highest profit than all the other rations.

#### **Cassava Petiole-Leaf Meal As Substitute for Copra Meal in Broiler Rations.** Jose G. Bautista III, Romeo M. Ramirez, Mark Anthony L. Hipolito, Flor P. Alfonso and Paul Wassmer

Two hundred forty (240) day old Pilch broilers were randomly allotted to four levels of substitution of CM with CPLM replicated thrice with 20 birds per replication as follows: Treatment I - Control, 0% CPLM; II - 5% CPLM III - 10% CPLM; and IV - 15% CPLM.

Mean responses of the birds in all levels did not significantly differ in total body weight gain, total feed consumption, feed efficiency and carcass quality. In terms of gross return, Treatment IV registered the highest at P10.24 per bird.

#### **Agro-Industrial By-Products and Food Waste Materials as Potential Feed Resource in the ASEAN Region - The Philippine Experience.** L.S. Castillo, A.L. Gerpacio, J.E. Lapitan, G.C. Lugod, O.N. Gonzalez and Jose G. Bautista III of NIST and C.I. Mercado of UPLB

The AIBP and FWM materials were evaluated for their suitability as animal feed to monogastric or ruminant animals. Proximate analyses, minerals, detergent fiber, in vitro dry matter digestibility and nylon bag techniques, metabolizable energy, larval assay and broilers were used.

A broiler feeding trial to assess the potential of 16 agro-industrial by-products (AIBP) and food waste materials (FWM) was conducted for six weeks with feed consumption, final weights and weight gains (observed and adjusted for protein intake) and feed deficiencies as criteria.

AIBP and FWM used were: caimito rejects, choco meal, cornik, guayabano peelings, himbabao flowers and leaves, jackfruit rind and seed (boiled), mango peelings, mango seeds (raw or boiled), melon (raw or boiled), mango pods and sproutcoats, peanut shells, peanut tops and Philsoy residue from soymilk manufacture.

The materials were incorporated in rations at one to 3 levels each (10, 15, 20% of diet) depending on amount available. Two controls were also run, one a commercial broiler starter feed. Five to 6 individually caged broiler chicks were randomly assigned to a treatment in a CRD design and fed the diets to 6 weeks. All data obtained were analyzed statistically.

Results indicated at 15% cornik, 15% choco meal, 10% mango seeds, 15% boiled jackfruit seed, 10% melon (raw, dried) and 10% peanut tops, among the by-products evaluated, showed the highest potential in terms of weight gain and feed efficiency. Feed consumed ranged from 2.48 to 3.22 kg. Most of the AIBP and FWM were comparable to the controls when fed up to 15% in diets. Significantly, depressed performance was observed when incorporated at 20% diets.

\*\*\*\*

## ENERGY RESEARCH PROGRAM

**Production of High Quality Adsorbents from Philippine Woods. Part I. Production of Powdered Activated Carbon.** V.P. Arida, O.G. Atienza, T.A. Quilao, A.R. Caballero, J.S. Laxamana, D.L. Pugal and C.P. Guce

A study on the production of activated carbon from selected woods including coir dust, was done adapting the fluidized bed method for carbonization and activation. Carbonization was carried out in a continuous inner heat type reactor at 420°C; the yield of charcoal generally ranged from 10% to 30%, except coir dust which gave 35%. Activation was done batchwise in an external heat type reactor under an atmosphere of superheated steam. Using char products from selected raw materials, comparative activation studies were also carried out in an inner heat type activating reactor. The various factors which

influence the absorptive properties of activated carbon products were determined and established for both reactors. At activation temperature between 800°C to 900°C and 30% yield, absorptive values obtained were as follows: internal surface area, 1000 - 1500 m<sup>2</sup>/g AC; methylene blue value, 270 - 370 mg MB/g AC; iodine value; 1000 - 1200 mg I<sub>2</sub>/g AC. These values compare favorably with those of commercial grade activated carbon.

**Production of High Quality Adsorbents from Philippine Woods Part II. Granulated Activated Carbon.** V.P. Arida, O.G. Atienza, T.A. Quilao, A.R. Caballero, J.S. Laxamana D.L. Pugal and C.P. Guce.

From a total of 12 Philippine wood species studied, two were selected for the production of granulated activated carbon: ipil-ipil and coconut coir dust. Using the fluidized bed method, the optimum conditions required for granulation of the carbonized chars were studied with molasses as binder. Char binder ratio of 1:0.5 and 1:0.8 were used for ipil-ipil and coir dust, respectively. Carbonized granules with particle sizes of 0.5 - 2.0 mm were activated using steam as activating agent in an external heat type reactor. Maximum absorptive values were obtained at 900°C and 850°C for ipil-ipil and coir dust respectively. Methylene blue absorption was 290 mg/g AC and internal surface area 1200 m<sup>2</sup>/g AC for the ipil-ipil while coir dust gave values of 390 mg/g AC and 1000 m<sup>2</sup>/g AC.

Gas adsorption tests carried out on both ipil-ipil and coir dust showed that both exhibited highest adsorabilities at 900°C. For benzene and acetone, maximum values of 40 - 50% (wt) were observed while carbon tetrachloride gave 70 - 90%. The results of the study indicate that the granulated activated carbon produced could find application in the adsorption of organic solvents, gas adsorption processes and water treatment, among others.

**Production of Activated Carbon from Coir Dust by Fluidized Bed Method.** V.P. Arida, O.G. Atienza, A.R. Caballero, T.A. Quilao, J.S. Laxamana, D.L. Pugal and C.P. Guce.

Coir dust, which comprises 65% (wt) of the whole coconut husk and a waste product from coconut husk processing, was investigated as a source of activated carbon. Adapting the fluidized bed technique carbonization was carried out in air at 430°C and activation with steam at 850°C. Yields of 36% and 28% (wt) were obtained in the carbonization and activation processes, respectively. The activated coir dust char product exhibited high adsorptive power, which compares favorably with the commercial grade activated carbon.

**Production of Activated Carbon From Philippine Woods and Wastes By Fluidized Bed Method with Chemical Treatment.** V.P. Arida, O.G. Atienza, T.A. Quilao, A.R. Caballero, J.S. Laxamana, D.L. Pugal, C.P. Guce, L.P. Gelera and GIDLH/ITIT Staff

This paper presents the results of a subsequent study done by the NIST and the Government of Industrial Development Laboratory, Japan, on the application of chemical treatment prior to activation, another approach for the production of high quality adsorbents.

The chemical method involves interaction of the raw material and a chemical activating agent, usually in concentrated form, with thorough mixing and kneading. In so doing, cellulose and other organic compounds present are degraded, resulting in a plastic mass. The treated material is heated in a kiln from which air is excluded and pyrolytic decomposition takes place.

**Continuous Fluidized Bed Gasification of Cellulosic Wastes for Power Generation.** V.P. Arida, A.L. Gonzales, O.G. Atienza, D.L. Pugal, D.B. Isaac, J.S. Pontevida, E. Suavillo, K. Niikawa, M. Miura and S. Suzuki

A continuous fluidized bed reactor system was developed for the gasification of cellulosic wastes to produce gas fuel product suitable for power generation. A practical procedure for steady state operations for the conversion system was established. Based on the results obtained, the yield, gas composition and heating value of the gas products were found to be primarily influenced by such factors as feedrate, chemical composition of the raw materials-type and ratio of fluidizing medium and fluidizing gas. Low calorie gas product can be continuously produced from the gasification of cellulosic wastes using either steam, air, or combinations thereof. At optimal conditions, the gas products gave heating values ranging from 1,000 to 3,8000 kcal/Nm<sup>3</sup>.

A fluidized bed gasification system using air as the fluidizing gas was found to be a practical process for the production of low calorie gas fuel which can be used for power generation. The gas product with heating values as low as 1,100 kcal/Nm<sup>3</sup> proved to be suitable as a fuel for a gas engine for generation of electricity or heat co-generation systems.

**Production of Petroleum Fuel Substitutes by Catalytic Cracking of Coconut Oil\*** V.P. Arida, M.T. Usita, M.L. Angeles, C.H. Hernandez and L. Manalo

The production of petroleum fuel substitutes from coconut oil by catalytic cracking has been investigated. Studies were done on both laboratory and pre-pilot plant scale. Liquid fuels (gasoline, kerosene, diesel) and

gas products were obtained. From among several catalysts earlier tried, NaOH (4%, wt) was found suitable and practical for the conversion process. A wood fired reactor/converter which was designed and fabricated for the purpose was used for the pre-pilot study. Batch catalytic cracking of coconut oil gave recovery of liquid fuels ranging from 60 to 78% (vol) based on oil. Gas product evolved varied from 171 - 1053 liters/batch; it was analyzed for composition by gas chromatography. Representative sampling gave heating value of 10,730 kcal-Nm<sup>3</sup>.

The processing technique and set-up can further be simplified and improved for application in the countryside.

#### \* ORGANIC CHEMISTRY PROGRAM

**Simplification Process on the Preparation of Toilet/Bath Soap.**

The commercial process on the preparation of toilet soap from coconut oil and tallow has been simplified using the cold process. Laboratory conditions on its preparation was optimized and evaluated to determine the most favorable parameters that would give the best quality soap comparable to commercial product.

**Process Development of a Transparent Beauty Soap Using Locally Available Raw Materials.**

A semi-boiled process of preparing transparent glycerin soap has been developed from locally available sources. It has been prepared from the alcoholic saponification of various amounts of coconut oil, castor oil and tallow mixture at specified period of time and reaction temperature. Incorporation of diethanolamide from methyl ester of coconut oil has been added to give the soap a creamy lather. Maturation time of the glycerin soap has been taken into consideration to obtain at least 7% moisture content.

**Studies on the Production of Dextran and Synthesis of Dextran-Sucrase by a Culture of *Leuconostoc Monsete-roides*.**

Conditions for dextranucrase production, such as pH maintenance at 6.7 at a period of six (6) hours at an early stage during fermentation and also controlling the pH at 5.5 at harvest time and with enzyme activities obtained comparable to that in the literature have given dextran yields in pH 5.5, acetate buffer, which are near the theoretical yield 47.37% (based on the initial amount of sucrose). Such conditions for raw dextran synthesis are as follows: dextran-sucrose concentration of 15%



volume per volume of substrate; 5% sucrose concentration, and a temperature of 25°C and 48 hours production time.

This paper has described dextran yields and enzyme activities attainable with the use of the equipment available at the Chemical Research and Development Center and with conditions based on four references cited.

This is an output of the preliminary studies on dextran and dextransucrase production under the NSTA-NIST Project 8104.2 entitled "Production of Dextran and Fructose from Sucrose" funded by UNFSSTD and NSTA.

#### **Barangay-Based Production of Laundry Soap By Cold Process. A.L. Gonzales, A. Labadan, S. Capulso, S. Tan, V.P. Arida**

The laundry soap technology uses the cold process which involve the reaction of the oil with a quantity of strong caustic alkali solution almost equivalent to that required for complete saponification.

The advantage of this process is that it is an energy saving process which involves the use of locally fabricated pedal-typed soap-mixer. The raw materials and chemical employed are locally manufactured and available. The process is simple and involves low production maintenance which renders it highly appropriate for adaption in the rural coconut communities or even by housewives at the household level.

\*\*\*

### **PHARMACEUTICAL RESEARCH PROGRAM**

#### **Essential Oil Technology and its Industrial Application. Felicidad E. Anzaldo**

Essential oils are the odoriferous principles derived from the different parts of the plant and are used as essence and flavorings for many industrial products, medicinal and cosmetic preparations.

Citrus oil is a typical example of essential oil obtained from citrus fruits. Of the three basic methods of extracting the essential oil, namely distillation, expression and extraction by solvents, liquid and solid fats; steam distillation was used for separating the oil from the fresh rind of the ripe fruit of *Citrus medica* Linn. The oil was subjected to thin layer chromatography, gas chromatography and spectrophotometry. Based on the results obtained, there is a great possibility that limonene is present in the oil.

R & D on essential oils from various local plants were conducted at the Pharmaceutical Research Program of the NIST and showed that commercial production is feasible.

As an initial step, technology for the production of essential oils from local plants has been successfully transferred to Helen's Pharmaceutical Laboratory in Cagayan de Oro City to enable the firm to produce essential oils in commercial scale for domestic and export markets.

#### **Philippine Grown Spices for Food and Medicinals. Felicidad E. Anzaldo and Josefina B. Manalo.**

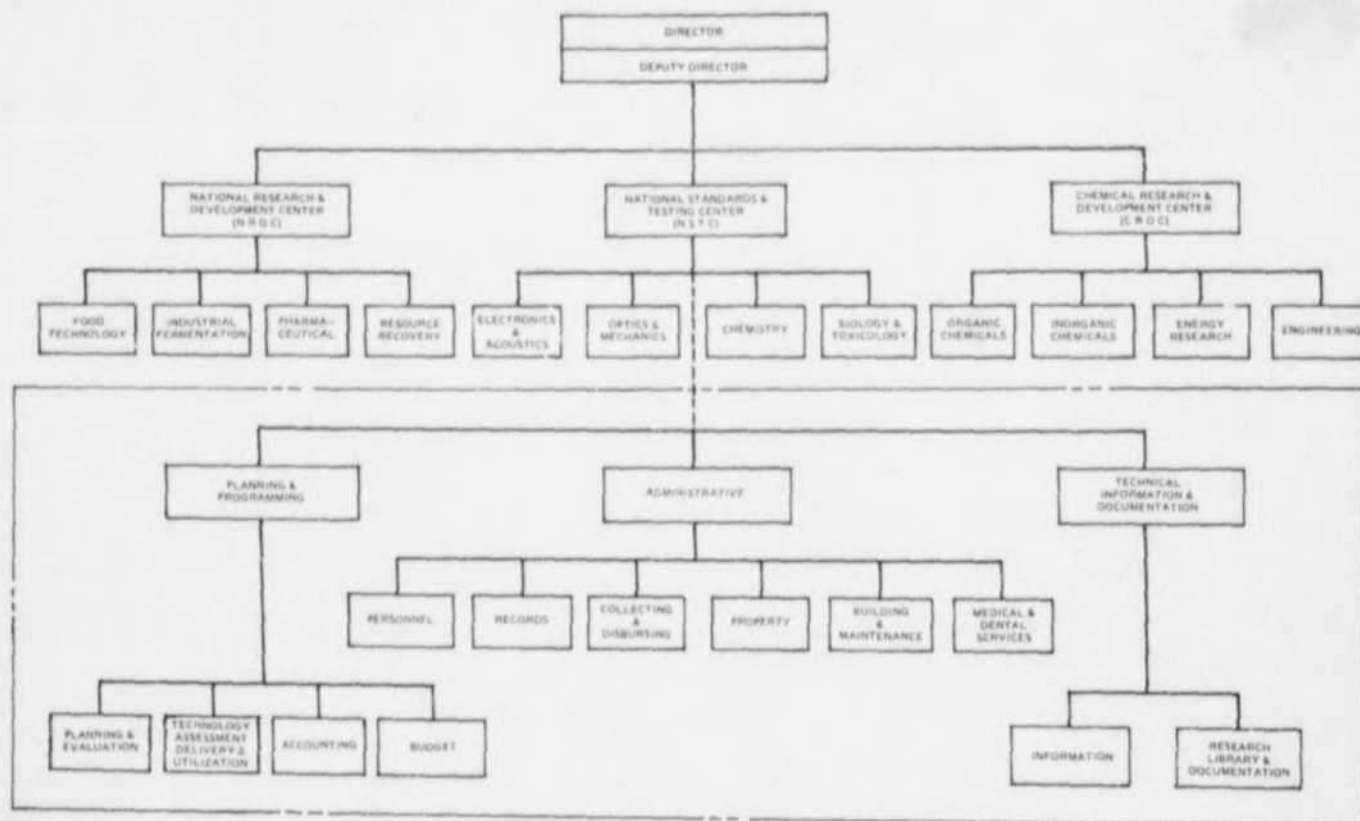
The uses of Philippine spices such as *Zingiber officinale* Roscoe, *Allium cepa* L., *Allium sativum* L., *Curcuma longa* L., *Piper nigrum* L., *Laurus nobilis* L., *Eugenia caryophyllata* Thunb., *Coriandrum sativum* L., *Capsicum frutescens* L., *Mentha cordifolia* Opiz, *Foeniculum vulgare* Miller and *Coleus amboinicus* Lour., for the manufacture of food and medicinals are described.

Spices commonly used for selected pharmaceutical preparations and flavorings are listed. Market demand for these spices and its effect on the price structure and availability for the manufacture of food and medicinals are discussed. Commodity clearances by the specialized government office, like the Philippine Standard Association, responsible for the standardization of the commodity are also presented.

\*\*\*



ORGANIZATIONAL CHART  
(As of December 1985)



NIST KEY OFFICIALS  
(As of December 1985)

DR. FILEMON A. URIARTE, JR.  
Director

Mrs. Olympia N. Gonzalez  
Chief, National Research &  
Development Center  
(NRDC)

Ms. Mercedes R. Soriano  
Chief, National Standards  
& Testing Center  
(NSTC)

Mrs. Violeta P. Arida  
Chief  
Chemical Research &  
Development Center (CRDC)

Mr. Jose G. Bautista III  
Head  
Food Technology Program

Mr. Edgardo S. Juan  
Head, Electronics &  
Acoustics Department

Mrs. Antonia L. Gonzales  
Head, Organic Chemicals  
Research Program

Dr. Lydia M. Josen  
Head  
Industrial Fermentation

Mr. Edwin T. Palma  
Head, Optics & Mechanics  
Department

Ms. Concepcion G. Pigao  
Head, Inorganic Chemicals  
Research Program

Dr. Felicidad E. Anzaldo  
Head, Pharmaceutical  
Research Program

Dr. Ernesto S. Luis  
Head  
Chemistry Department

Mrs. Ofelia G. Atienza  
Head, Energy Research  
Program

Dr. Claro M. Santiago, Jr.  
Head, Resource  
Recovery Program

Dr. Eulalia L. Venzon  
Head, Biology/  
Toxicology Department

Mr. Benigno M. Garcia  
Head, Engineering  
Research Program

Ms. Mercedes R. Soriano  
Officer-In-Charge  
Administrative Department

Mr. Alberto S. Pesigan  
Chief  
Planning & Programming Division

Mr. Ronald M. Henson  
Chief, Technical Information & Documentation Division